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WORD ASSOCIATION AND THE ACQUISITION OF GRAMMAR

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Every natural language is a system. From knowledge of one part it is possible to anticipate correctly many other parts. The linguistic scientist studies some finite set of utterances (his linguistic "corpus") in search of the recurrent elementary units and patterns of combination that will generate the infinite set of utterances belonging to the language. Every child, in learning his first language, does much the same thing with the difference that he does not explicitly formulate most of the rules that govern his language behavior. A child is not, in his first few years, exposed to all possible utterances belonging to the community language but only to that small sample brought to him by his family, his friends, and television. Exposure to this sample, however, teaches him to understand and to produce utterances not actually experienced but implied by what has been experienced. The child may begin as a parrot imitating what others say, but he will end as a poet able to say things that have not been said before but which will be grammatical and meaningful in his community. This is the terminal achievement which a theory of language acquisition must explain.

The linguistic scientist describes language systems at several levels: the *phonological* level of distinctive sound elements and their permissible combinations; the *morphological* level of elementary meaningful forms (*morphemes*) and their combination to make words; the *syntactic* level of sentence creation from words. We have described elsewhere (2) these

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three levels and have reported two studies (1, 3) concerning the acquisition by children of morphology and syntax. The present study is concerned with syntax and, more particularly, with the child's utilization of the English parts-of-speech.

The linguistic scientist defines the parts-of-speech in purely syntactic or formal terms. He has shown that the English teacher's semantic definitions (e.g., "a noun is the name of a person, place, or thing") are imprecise approximations to the underlying but less obvious syntactic facts. The noun, in descriptive linguistics, is a class of words having similar "privileges of occurrence." Nouns are words that can follow articles and can occur in subject and object positions and, in this respect, are distinct from such other classes of words as the verb, adjective, and adverb. The fact that the words of any language fall into classes of approximate syntactic equivalents is of great interest to the student of language acquisition because it suggests one of the ways in which the lawful flexibility of speech is developed. A new word is ordinarily introduced to a child in a sentence, and this sentence will often serve to identify the part-of-speech to which the new word belongs. If the parts-of-speech have been internalized, this would mean that one vast array of sentence positions is available for the new word and other arrays are not. From the fact that *X* is a noun one can anticipate all of the grammatically acceptable uses of *X* and set aside all of the unacceptable uses. Is there evidence that children learn to operate with the parts-of-speech? We suspect that such evidence is to be found in certain well-established facts concerning word association.

Since the experiment of Woodrow and Lowell (7), it has been known that the word associations of children show consistent differences from the associations of adults. Woodworth (8) offers as examples of these differences the words appearing in Table 1. Woodrow and Lowell and others after them have conceptualized these differences in terms that are primarily semantic. Children are said to give more "contiguity" responses and more "whole-part" responses while adults are said to give more "coordinate," "contrast," and "similarity" responses. In several cases Woodrow and Lowell desert their semantic concepts and speak of "adjective-noun" associations and "verb-object" associations (both of which are more common in children's than in adult's responses). These classifications by parts-of-speech suggest a very general formal principle which contrasts the word associations of children and adults, a principle which so far as we know was first suggested by Ervin (4). The associative responses of adults belong to the same part-of-speech as the stimulus word more often than do the associative responses of children. We shall speak of the adult type of association as homogeneous-by-part-of-speech (abbreviated Hmg.) and the child's type as heterogeneous-by-part-of-speech (Htg.).

Looking again at the examples of Table 1, we see that the response favored by adults is almost invariably Hmg. while that favored by children is Htg. Many of the largest differences found in the Woodrow and Lowell study

TABLE 1

WORD ASSOCIATIONS FROM ADULTS AND CHILDREN

Stimulus	*Response*	*1000 Children*	*1000 Men and Women*
Table	Eat	358	63
	Chair	24	274
Dark	Night	421	221
	Light	38	427
Man	Work	168	17
	Woman	8	394
Deep	Hole	257	32
	Shallow	6	180
Soft	Pillow	138	53
	Hard	27	365
Mountain	High	390	246
	Hill	91	184

conform to this syntactic principle though they were not so classified by the authors. In addition to these data from the past there are recent findings of Ervin (4) who used a list of common words belonging to various parts-of-speech with groups of children in kindergarten and the first, third, and sixth grades. She found large increases with age in Hmg. responses to nouns, verbs, prepositions, adjectives, and adverbs. What is the significance of this apparently reliable developmental trend in word association?

There are, of course, many kinds of association that can link one word with another; similarity or contrast of referents, spatio-temporal contiguity of referents, and high transition probabilities between words are obvious possibilities. Similarity and contrast and contiguity between referents would sometimes lead to Hmg. responses (e.g., *table-chair*) and sometimes to Htg. responses (e.g., *table-eat*). Immediate transitions of high probability will very seldom exist between two words of the same part-of-speech, and so such pairs as *dark-night, deep-hole,* and *soft-pillow* are Htg. Elaborating a suggestion of Ervin's (2), we propose that the word associations of very young children are governed by such principles as we have cited but that, with increasing age, another principle of association begins to operate which has the effect of increasing the number of Hmg. responses.

From the time that a child begins to use phrases his speech repertoire will manifest the morphological structure that is a universal characteristic of adult speech in any language. The same meaningful forms (morphemes and words) occur in a variety of contexts; not all forms can occur in all contexts but some forms can occur in some of the same contexts. From

these morphological universals it follows that words resemble one another in the degree to which they have similar privileges of occurrence. This syntactic similarity is always objectively present in speech involving phrases but probably it takes considerable time and maturity to analyze out syntactic similarity. The appreciation of syntactic similarity is, however, prerequisite to the ability to form meaningful and grammatical sentences that are not imitated from someone else. Suppose a child has learned that such words as *house, barn, table,* and *fence* can all occur in such positions as: "See the ——"; "I own a ——"; "The —— is new"; and "This —— is mine." If now he hears for the first time such a sentence as "See the *car*" in which *car* is a new word, he can be prepared to say "I own a *car*"; "The *car* is new"; and "This *car* is mine." Of course, the particular sentence uttered on a given occasion depends on semantic and motivational factors but the universe of sentences from which the particular can be drawn is established by the syntactic kinship linking *car* with *house, barn, table,* and *fence.*

Modern methods of teaching second or foreign languages begin, as does first language learning, with the repetition of phrases which recombine a limited set of meaningful elements. In second language learning, as in first, there comes a time when the student "creates" a phrase by realizing the syntactic implications of the material practiced. This is often accomplished nowadays by implicit induction without any explicit tuition in syntactic rules, and that is exactly the way it is accomplished by all children who become full participants in a first language.

Syntactic similarity is a matter of degree. The parts-of-speech are simply very large and very useful classes of approximate combinational equivalents. Animate nouns are more closely equivalent than nouns in general, and transitive verbs are more closely equivalent than verbs in general. Such popular adult word associations as *bright-dark* are not only semantic antonyms; they are also adjectives having highly similar privileges of occurrence. *Bright* has more sentence contexts in common with *dark* than with such another adjective as *virtuous.* It is our general hypothesis that, as utilization of syntax develops in children, syntactic similarity in words becomes an increasingly important determinant of word association and that the developmental trend from Htg. responses toward Hmg. responses is a manifestation of this great step forward into syntactic operations. We have undertaken to test this hypothesis by relating the child's tendency to give Hmg. word associations to his ability to make correct grammatical use of new words after hearing them in a couple of sentences.

Method

We worked with four groups of 20 subjects each. In each group there were equal numbers of male and female subjects. Groups I, II, and III were students from, respectively, the first, second, and third grades of the

Michael Driscoll School in Brookline, Massachusetts. The Driscoll School is a public school in a middle-income residence area. Children in a given group were all taken from the same classroom and simply drawn in the order of the seating arrangement until 20 had served. The fourth group (Group Ad.) consisted of 20 adults, students or staff at M.I.T., who responded to an advertisement asking for subjects.

Word Association Test

This test consisted of 36 stimulus words such that there were six words representing each of six parts-of-speech. The words were selected because all have high frequency in the speech of American elementary-school children (6) and because in earlier studies they yielded large differences between the associations of children and adults. The words were presented in a constant order to all subjects.

Verbs in English may be subdivided into transitive and intransitives. Intransitive verbs can appear without an object (e.g., "We *laugh*") while transitives almost always occur with some sort of object (e.g., "We *sent* something"). For the present experiment the transitives and intransitives were treated as two parts-of-speech, and there were six words representing each of them.

Nouns in English can be separated into "count nouns" and "mass nouns." The names are suggested from a distinction of reference; count nouns usually name bounded objects (e.g., *table, house*) while mass nouns name extended substances (e.g., *milk, sand*). However, there is also a clear syntactic distinction; count nouns in the singular can be preceded by *a* while mass nouns cannot (e.g., *a table* but not *a sand*) and, in addition, count nouns, when preceded by *some,* appear in the plural whereas mass nouns appear in the singular (e.g., *some tables* but *some milk*). On the present list of stimulus words there were six mass nouns and six count nouns.

In addition to the two varieties of noun and two varieties of verb, there were six adjectives and six adverbs on the list. The complete list is as follows:

Count Nouns (C.N.): table, house, foot, needle, apple, doctor.
Mass Nouns (M.N.): milk, water, sand, sugar, air, cheese.
Adjectives (Adj.): dark, soft, cold, white, sweet, hard.
Transitive Verbs (T.V.): to send, to bring, to find, to take, to hit, to invite.
Intransitive Verbs (I.V.): to skate, to come, to live, to laugh, to stand, to walk.
Adverbs (Adv.): quickly, slowly, sadly, now, softly, gently.

Many English words belong to more than one part-of-speech. It is possible in English to *table* a motion and to *foot* a bill but *table* and *foot,* in the vast majority of their occurrences, function as nouns and, when presented in isolation as stimulus words, are apprehended as nouns by most

English-speaking adults. The words on the present list belong primarily to one part-of-speech though they may have secondary membership in others. The verbs were presented as infinitives with preceding *to* so that their verbal character would be clear.

Usage Test

The general plan of this test was to introduce to *S* a new word (actually a pronounceable nonsense syllable) by using it in two sentences. The two sentences were adequate to place the word in one of six parts-of-speech: the count noun, mass noun, transitive verb, intransitive verb, adjective, or adverb. After this introduction to the word, *S* was asked to use it in sentences of his own creation, and these were scored as correct if the new word was used as it ought to be in view of the part-of-speech implied by the introductory sentences.

As "new words" 12 nonsense syllables were used: *wug, boff, latt, roog, stog, huft, nass, sib, bik, rik, nare,* and *pilk*. There were 12 problems in all with two syllables assigned to each of the six parts-of-speech. The syllables were rotated through all 12 problems so that there was no regular association between any syllable and any particular problem. The syllable *wug* will be used here to indicate the general character of the presentations.

For each problem, *S* was shown a colorful picture of either a girl, a boy, a man, a woman, a cat, or a dog, and *E* read text of the following kind: "Do you know what a *wug* is? This is a picture of a little girl thinking about a *wug*. Can you make up what that might mean?" This was the presentation identifying *wug* as a count noun. Where *wug* was to be identified as an intransitive verb, *E* would say: "Do you know what it means to *wug*? This is a picture of a little boy who wants to *wug*." With *wug* as mass noun there would be such sentences as: "This is a cat thinking about some *wug*." With wug as transitive verb such a sentence as this was used: "This is a woman who wants to *wug* something." Where *wug* was to be identified as an adverb, *E* spoke of a dog thinking of doing something *wuggily*.

There were two problems for each part-of-speech and a different syllable for each problem. There were two identifying sentences for each problem and, in the case of the adjectives and adverbs, the appended suffixes *-y* and *-ly*. The pictures gave no clue to the meaning of the new word and were only included to interest the child and keep his attention. The figures in the pictures were always simply thinking about the new word, not demonstrating its meaning.

Procedure

E was introduced to the children in a class by the teacher, and the class was told that each member would have a chance to look at some pictures and play some games. The children were interviewed individually either in the corridor outside the classroom or in an unused classroom. The Word Association Test was presented first with the remarks: "This

is a game called 'say a word.' Have you ever played 'say a word'? Well, this is the way it works. I'm going to say a word and I want you to listen to my word and then say another word, not my word but a different word. Any word is all right so long as it's the first word that comes into your head when you hear my word. Are you ready?"

When the word associations had been recorded, *E* brought out the picture cards and said: "Now we're going to play a making-up game. How are you at making things up? Pretty good? Well, let's see." The problems were presented so as to go through all parts-of-speech once before repeating any of them.

The procedure with adults was the same except that *S* knew he was participating in an experiment on language and *E* did not call either part a game. In explanation of the brightly colored pictures and rather childish text, the adults were told that the tests had been designed for use with children as well as with adults.

Scoring

Scoring on the Word Association Test involves assigning response words to a part-of-speech; scoring on the Usage Test involves determining from *S*'s use of a new word the part-of-speech to which *S* has implicitly assigned the new word. Because English words can belong to more than one part-of-speech and because single sentences employing a new word do not always unequivocally indicate the part-of-speech membership of the new word, there were sometimes problems in scoring.

On the Free Association Test those response words that were marked with characteristic suffixes (adjectives and adverbs) or with the *to* of the verbal infinitive could be confidently classified. With most potentially doubtful responses membership in one part-of-speech is so much more common than membership in another that it was safe to assign the word this primary membership. Where there was some doubt, however, *E* asked *S* to use the response word in a sentence and, in doing so, *S* revealed the part-of-speech he had in mind. It was necessary for *E* mentally to score the responses as they were elicited so that he could resolve scoring problems where necessary.

On the Usage Test *S* sometimes translated the new word into a conventional English word. When told that a man was thinking about some *wug* and asked to "tell what that might mean," *S* sometimes provided a familiar word as a translation, saying for instance, "He is thinking about some *milk*." In such a case the part-of-speech membership of the familiar equivalent was scored and would be correct, in the present instance, as *milk* is a mass noun and that is the part-of-speech implied for *wug*. Where the translation word was not clearly of one part-of-speech, *E* encouraged *S* to "say some more about it."

In other cases *S* interpreted the Usage Test as calling for use of the new word in a sentence and so might provide: "The man has some *wugs* for breakfast every day." In such a case the part-of-speech was inferred

from the sentence and, in the present instance, would be scored incorrect as *wug* has been used as a count noun. Not every sentence is unequivocal in this regard, and so it was sometimes necessary to urge *S* to say a little more.

Results

There were 36 stimulus words on the Free Association Test, six words for each of six parts-of-speech. Each of the 36 response words (or phrases) was scored as Hmg. or Htg. with reference to its stimulus word, and so for every subject there was a possible maximal score of six Hmg. responses for each of six parts-of-speech. There were 12 new words on the Usage Test, two words for each of six parts-of-speech. Each of the new words was scored Hmg. or Htg. according to the agreement between the part-of-speech implied by the introductory sentences and the part-of-speech implied by *S*'s use or translation of the new word. For each *S*, therefore, there was a possible maximal score of two Hmg. responses on each of six parts-of-speech. After the rules of scoring had been developed by one judge, another judge independently scored 10 complete protocols (360 response words on word association and 120 new words on usage) from the rules. The two scorings agreed perfectly except for three instances where more information should have been elicited, and so it appears that this is essentially an objective scoring problem with no difficulties in the reliability sphere. The mean Hmg. scores for each part-of-speech and each age group appear in Table 2.

Table 2

MEAN HMG. SCORES ON FREE ASSOCIATION AND USAGE FOR EACH PART-OF-SPEECH AND EACH AGE GROUP

	Free Association						
Group	*C.N.*	*Adj.*	*I.V.*	*T.V.*	*Adv.*	*M.N.*	*Total*
Ad.	5.10	5.00	4.80	4.45	4.95	2.35	4.44
3rd	4.65	3.65	3.40	2.95	1.95	2.40	3.17
2nd	4.55	3.90	2.75	2.40	2.25	1.90	2.96
1st	3.95	1.25	1.60	1.40	.80	1.20	1.70
Total ...	4.56	3.45	3.14	2.80	2.49	1.96	3.07
	Usage						
Group	*C.N.*	*Adj.*	*I.V.*	*T.V.*	*M.N.*	*Adv.*	*Total*
Ad.	1.85	1.75	1.70	1.60	.95	1.20	1.51
3rd	1.45	1.65	1.65	1.75	.55	.55	1.27
2nd	1.55	1.50	1.20	1.10	.70	.45	1.08
1st	1.20	.75	.90	.90	.45	.10	.72
Total ...	1.51	1.41	1.36	1.34	.66	.58	1.15

A two-way analysis of variance with 20 cases in each cell was carried out for the Free Association means and another for the Usage means. The results are summarized in Tables 3 and 4. Both age and part-of-speech account for large amounts of variance. In addition, there is a significant interaction between the two variables, and it can be seen in both the Free Association and Usage means that the increase with age of Hmg. responses is far less for count nouns than for the other parts-of-speech.

TABLE 3

ANALYSIS OF VARIANCE FOR FREE ASSOCIATION MEANS

Source	*Sum of Squares*	*df*	*Variance Estimate*
Age (rows)	453.6167	3	151.2056
Parts-of-Speech (columns)	321.2167	5	64.2433
Interaction	84.6833	15	5.6456
Individual differences (within cells)	1345.3500	456	2.9503
Total	2204.8667	479	

Interaction $F = 1.91$; $p < .05$.
Age $F = 26.78$; $p < .001$.
Parts-of-Speech $F = 11.38$; $p < .001$.

TABLE 4

ANALYSIS OF VARIANCE FOR USAGE MEANS

Source	*Sum of Squares*	*df*	*Variance Estimate*
Age (rows)	40.0896	3	13.3632
Parts-of-Speech (columns)	67.2688	5	13.4538
Interaction	11.1673	15	.7445
Individual differences (within cells)	208.5556	456	.4574
Total	327.0813	479	

Interaction $F = 1.63$; p about .05.
Age $F = 17.95$; $p < .001$.
Parts-of-Speech $F = 18.07$; $p < .001$.

We are not primarily interested in the effects of age and of part-of-speech and so will not compare the 24 individual means for each test. It is, however, worth noting the extraordinary uniformities in Table 2. The individual means have been arranged in the order of the grand means of the rows (age groups) and columns (parts-of-speech). When this is done for Free Association, there are only three reversals of one position each in the

age order, only four reversals of one position, and a single reversal of two positions in the part-of-speech data. The same sort of ordering of the Usage means results in only three reversals of one position each in the age order, only one reversal of three positions, and one reversal of two positions in the part-of-speech order. There is clear confirmation in this table of the increase with age of Hmg. responses found by Ervin (4) and also clear evidence that the count noun and adjective function in child speech in advance of other parts-of-speech. Finally, ordering the Free Association and Usage cell means in the order of their grand means results in identical age and part-of-speech orders (except for a reversal of the Adv. and M.N. columns) in the two sets of data. This is a good first indication of the covariation in free association and usage which is the effect predicted by our hypothesis. We proceed to a more detailed presentation of the evidence for this effect.

It would have been possible to compute correlations between the individual scores on usage and the individual scores on free association for each part-of-speech and each age group. We examined these scores and saw that the correlations would be very small, probably because the usage scores can only range from zero to two and because this small sample of usage from each *S* is not a very reliable measure of *S*'s grammatical skills. We decided to work instead with the means of Table 2 which yield a greater range of scores and a more reliable estimate of grammatical skill in a kind of *S*. The rank-order correlation between the 24 means from the Free Association Test and the 24 means from the Usage Test is .84, and this is a relationship significant at far better than the .001 level.

TABLE 5

RANK ORDER CORRELATIONS BETWEEN FREE ASSOCIATION AND USAGE HMG. SCORES

Rho for all paired means, $N = 24$	.84	$p < .001$
Rho for grand means of the parts-of-speech, $N = 6$	.94	$p = .01$
Rho for Adults, $N = 6$	.83	$p = .05$
Rho for 3rd grade, $N = 6$	.46	$p = .40$
Rho for 2nd grade, $N = 6$	.94	$p = .01$
Rho for 1st grade, $N = 6$	.83	$p = .05$
Combined p value for adults, 3rd grade, 2nd grade, 1st grade		$p = .0002$

Contributing to the rank-order correlation of all 24 means is the tendency for usage and free association scores to increase with age as well as the tendency for scores on the six parts-of-speech to covary for usage and free association. Insofar as the correlation is generated by the former factor, it is possible that we have nothing more here than a tendency for all sorts of language performance scores to move together with increasing age

towards adult values. We are interested in something more particular than this. We want to know whether the increasing tendency to give Hmg. responses in free association can be interpreted as evidence of the developing organization of vocabulary into parts-of-speech which define correct grammatical usage for new words. We shall have better ground for this interpretation if correlations exist with the age variation taken out. One way of accomplishing this effect is to correlate the grand means (across all age groups) for the six part-of-speech columns for free association and usage. This rank order *rho* is .94 and even with only six cases that value is significant at about .01. Another way of testing for this relationship is to correlate the six paired means for each of the four age groups. The results appear in Table 5 (together with the previously mentioned *rhos*); three are significant and one is not. The *p* values for these four samples can be combined to yield a single *p* value for the relationship of free association to usage. Mosteller and Bush (5) suggest transforming the individual *p* values into normal deviates, summing them, and dividing the sum by the square root of the number of observations. The resultant value is itself a normal deviate with a *p* of about .0002. It seems very certain, therefore, that Hmg. scores for free association are related to Hmg. scores for usage.

Discussion

The change with age in both free association and usage is very striking when one examines individual protocols. For free association, consider the stimulus words *to send*. One first grade child responds *away*, another *letter*, another *a card*, another *mail*, etc. In response to this same word adults give: *to receive, to get, to deliver, to bring, to mail, to fetch*. Both the child responses and the adult responses are semantically related to the stimulus word, and the one set does not seem to be any more so than the other. The difference lies with the fact that the child responses are phrase completions (words that commonly follow the stimulus) while the adult words would almost never follow *to send* in an English sentence but are very closely matched with it in that they are transitive verbs. More specifically, the adult responses are transitive verbs naming human actions which ordinarily have some small inanimate thing as object. This further similarity is semantic but, in addition, involves a closer syntactic match than would be true for transitive verbs in general.

Consider now the sort of thing that happens on the Usage Test with a nonsense syllable intended to be a transitive verb. One first grade child was told: "This is a cat who wants to *niss* something. Can you make up what that might mean?" The child replied: "The cat wants a fish. A *niss* is a fish." To this same problem an adult responded: "The cat wants to catch something. To *niss* is to catch." The child seems to have put together knowledge about cats and the sound of *niss* to come up with a count noun—*fish*. He was not troubled by the fact that this translation violates

the part-of-speech membership of *niss*. When *E* says "to *niss* something," that should exclude the possibility of saying "A *niss* is a fish," but, for this child, it does not. Apparently the first grade children paid little attention to the formal marks of the syntactic potentialities of *niss*. The adult, on the other hand, principally attended to these marks. In many cases the translations provided by adults seem to have been suggested by the sound of the new word even as *niss* suggested *fish* to the first grader. However, when this happened with adults, it was almost always within the limits of the class of words suggested by the syntactic cues. In general, then, both the free association results and the usage results seem to be manifestations of the developing organization of vocabulary into syntactic classes.

As the analyses of variance have demonstrated, both age and part-of-speech are highly significant determinants of the number of Hmg. responses on both the Free Association and Usage tests. These two variables may perhaps be conceptualized as a single determinant—the amount of experience with words belonging to a part-of-speech. Experience of words in all six parts-of-speech is bound to increase with age, and Hmg. responses on all parts-of-speech clearly do increase with age. In addition, however, we note in Table 2 that the count noun and the adjective produce more Hmg. responses across all age levels than do the other parts-of-speech. While we do not know of any exact tests of the frequency of occurrence in English of words belonging to the various parts-of-speech, it seems to us that no test is needed to persuade the native speaker that count nouns and adjectives are more common than intransitive verbs or transitive verbs or adverbs or mass nouns. This is to say that at any given age a speaker of English is likely to have had more experience of count nouns and adjectives than of the other parts-of-speech we have studied.

The count noun has always the highest number of Hmg. responses and, indeed, does not change greatly in this respect from the first grade to adulthood because it is already at a near peak level in first graders. The count noun is, of course, the kind of word adults regularly undertake to teach children, for these are the names of denotable things: a *man*, a *dog*, a *car*, a *bike*. Surely speakers of English have greater experience of words in this class than of words in any other class.

The low number of Hmg. responses generally obtained for mass nouns requires a special comment. The Htg. responses given to mass nouns were usually count nouns, i.e., members of the same major part-of-speech. There is a good reason why these two varieties of noun were not usually distinguished even by adults. Mass nouns in English can always be used as count nouns. Ordinarily one says *some sand, some water, some marble* but one can say *some sands, some marbles,* and even *some waters*. The difference is that in the former cases a quantity of a uniform substance is suggested while in the latter case varieties or subspecies of some category of substances are suggested. This syntactic overlap seems to result in an overlap on the word association and usage tasks.

We have suggested that degree of experience of words in a part-of-speech is the basic determinant of the degree to which that part-of-speech functions in free association and usage. The significant sort of experience might be the number of words belonging to the part-of-speech or the variety of sentences for each word or the number of occurrences for each sentence. Probably all of these kinds of experience are close correlates in the natural situation. There are many different count nouns in English; there are many different sentences for most count nouns; and there are many sentences involving count nouns that occur very frequently. Without deliberate experimental manipulation of experience it probably will not be possible to determine the relative importance of these factors.

Summary

It is a reliable finding that the response words provided by adults in a word association test usually belong to the same parts-of-speech as the respective stimulus words. There are fewer of these homogeneous-by-part-of-speech responses with young children; the tendency to associate words within a part-of-speech increases with age. The present paper suggests that this change in word associations is a consequence of the child's gradual organization of his vocabulary into the syntactic classes called parts-of-speech. To test the degree to which *S* has accomplished this latter grammatical task, a Usage Test was designed. In this test a new word was used in a couple of sentences which sufficed to indicate the part-of-speech to which the new word belonged. After hearing these sentences, *S* was asked to create some sentences of his own using the new word, and his performance was scored correct if it employed the word in ways permitted by its part-of-speech membership. Four groups of *S*s (adults and first, second, and third grade children) were given a Word Association Test (consisting of stimulus words belonging to six different parts-of-speech) and also a Usage Test (consisting of new words assigned to the same six parts-of-speech). The Word Association Test was scored for homogeneous responses within each part-of-speech and the Usage Test for correct usage in accordance with each part-of-speech. It was found that scores on both tests regularly increased with age and that scores on the two tests were closely related to one another. It was concluded that the formal change in word association and the ability to make correct grammatical use of new words are two manifestations of the child's developing appreciation of English syntax.

References

1. Berko, Jean. The child's learning of English morphology. *Word*, 1958, 14, 150-177.
2. Berko, Jean, & Brown, R. Psycholinguistic research methods. In P. Mussen (Ed.), *Handbook of research methods in child development*. New York: Wiley, in press.

3. Brown, R. Linguistic determinism and the part of speech. *J. abnorm. soc. Psychol.*, 1957, 55, 1-5.

4. Ervin, Susan M. Grammar and classification. Paper read at Amer. Psychol. Ass., New York, September, 1957.

5. Mosteller, F., & Bush, R. R. Selected quantitative techniques. In G. Lindzey (Ed.), *Handbook of social psychology*. Vol. I. Cambridge, Mass.: Addison-Wesley, 1954. Pp. 289-334.

6. Rinsland, H. D. *A basic vocabulary of elementary school children*. New York: Macmillan, 1945.

7. Woodrow, H., & Lowell, F. Children's association frequency tables. *Psychol. Monogr.*, 1916, 22, No. 97.

8. Woodworth, R. S. *Experimental psychology*. New York: Holt, 1938.

FREUDIAN THEORIES OF IDENTIFICATION AND THEIR DERIVATIVES

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Two years ago, prior to embarking on a program of research on parental roles and personality development, the writer was faced with the necessity of reviewing the literature on theories of identification. The task proved a difficult one on several counts. First, although current theory in this sphere derives almost exclusively from the work of one man—Sigmund Freud, the references to the topic are scattered *passim* through numerous books and papers written over half a lifetime. Second, when one finally views Freud's writings on this subject as a whole, it becomes abundantly clear that he often uses the same terms to refer to what are basically quite different concepts. Third, the above confusion becomes still further confounded in the later developments and modifications of Freud's theories by contemporary writers, who typically apply the same terminology in still other ways and introduce new names for concepts and processes discussed by Freud himself.

Having had to come to terms with these protean problems, the writer felt it might be useful to summarize in a single document the development of Freud's ideas and their elaboration by others and to make explicit the several levels of phenomena with which these theorists are concerned. Specifically, in addition to dealing with Freud's extensive discussion of the topic, this paper will treat with the criticisms and modifications of Freud's theory of identification by Stoke (29), Mowrer (19), Sanford (25), Sears (27), and Parsons (22). In the course of our examination, we shall attempt to clarify ambiguities and, where relevant data are available, to examine and evaluate theoretical ideas in the light of existing knowledge.

FREUD'S THEORY OF IDENTIFICATION

We begin our exposition with an analysis of the ever-changing notions of identification appearing in Freud's writings. Throughout these transformations one constant feature is discernible. Identification, however de-

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scribed, is invariably based on "an emotional tie with an object," typically the parent. Freud's conception of the precise nature of this emotional tie appears to have shifted somewhat over the course of the years. For the most part, the tie has as its context the attachments and antagonisms of the Oedipus conflict, but in his first exposition of this complex, published in 1900, Freud makes no mention of identification either explicitly or implicitly. We are told only that "we are destined to direct our first sexual impulses toward our mothers, and our first impulses of hatred and violence toward our fathers" (10, p. 308). As yet, there is no way out of this classic dilemma through identification. To the writer's knowledge, Freud's first extended discussion of the latter mechanism does not occur until fourteen years later in his essay "On Narcissism" (7). Although he does not refer to identification by name, he introduces here for the first time his theory of the development of the ego ideal and of conscience—the precursors of what he later called the superego.

> It would not surprise us if we were to find a special institution in the mind which performs the task of seeing that narcissistic gratification is secured from the ego-ideal and that, with this end in view, it constantly watches the real ego and measures it by that ideal. If such an institution does exist, it cannot possibly be something which we have not yet discovered; we need only to recognize it, and we may say that what we call our conscience has the required characteristics . . . (7, p. 52).

> For that which prompted the person to form an ego-ideal, over which his conscience keeps guard, was the influence of parental criticism (conveyed to him by the medium of the voice), reinforced as time went on, by those who trained and taught the child. . . . The institution of conscience was at bottom an embodiment, first of parental criticism, and subsequently of that of society (7, p. 53).

The essay on narcissism has import for Freud's theory of identification in two other respects as well. It is here that he develops for the first time the notion of an attachment to another person based on other than direct sexual impulse and desire. He refers to this type of attachment as *anaclitic object choice*; that is, an object choice which is essentially presexual in character and based on a "leaning" or dependency relationship with the mother or the person having to do with "the feeding, care, and protection of the child." This anaclitic relationship is important for our purposes since it later becomes the primary basis of one of the two mechanisms of identification which for a long time remain fused in Freud's thinking but are eventually distinguished. The first of these mechanisms involves identification as a function of loss of love, the second as a function of fear of the aggressor. We shall refer to the former as *anaclitic identification* and to the latter by Anna Freud's (4) classic phrase *identification with the aggressor*, or, more briefly, *aggressive identification*.

The first explicit discussion of identification appears in Freud's essay "Mourning and Melancholia" (6) published in 1917. In an attempt to explain the development of extreme self-criticism and feelings of worth-

lessness in patients who had recently lost a parent or other loved person, Freud proposed a developmental process involving three phases. The first phase, occurring in early childhood, consists in a "preliminary" form of identification in which ego and object are fused in a single undifferentiated pattern. Out of this there develops object choice, that is, the attachment of the libido to a person, typically the parent. Finally,

> . . . owing to a real injury or disappointment concerned with the loved person, this object relationship was undermined. . . . The object cathexis proved to have little power of resistance and was abandoned; but the free libido was withdrawn into the ego and not directed to another object. It did not find application there, however, in any of several possible ways, but served simply to establish an *identification* of the ego with the abandoned object (6, p. 159).

It is essentially this same three-phase sequence which forms the basis of Freud's extended discussion of identification four years later in *Group Psychology and the Analysis of the Ego* (11). Here, for the first time, the process is represented explicitly as a mechanism for resolution of the Oedipus complex. As before, the child begins with preliminary identifications with both parents but, in the case of the boy, the identification develops into

> a straightforward sexual object-cathexis toward his mother. . . . The little boy then notices that his father stands in his way with the mother. His identification then takes on a hostile coloring and becomes identical with the wish to replace his father in regard to his mother as well. Identification, in fact, is ambivalent from the very first; it can turn into an expression of tenderness as easily as into a wish for someone's removal (11, p. 61).

Here again, we may note that, as in Freud's earlier discussion, the notions of identification with a loved vs. a hated object are inextricably fused. Does the child identify with the father to recapture a lost loved and loving object or to defend himself against paternal threat and aggression, or both? The preceding quotation would seem to emphasize the obstructive and hostile aspects of the object with whom the child identifies. Yet, only a few paragraphs later Freud cites as an example of identification *par excellence* the instance of a young boy who, unhappy over the loss of a kitten, "declared straight out that now he himself was the kitten, and accordingly crawled about on all fours, would not eat at the table, etc."

It is in this essay that Freud states what is, in effect, his first formal definition of identification:

> It is easy to state in a formula the distinction between an identification with the father and the choice of the father as an object. In the first case, one's father is what one would like to *be*, and in the second he is what one would like to have. The distinction, that is, depends upon whether the tie attaches to the subject or the object of the ego. The former is therefore already possible before any sexual object choice has been made. It is much more difficult to give a clear metapsychological representation of the distinction. We can only see that identification endeavours to mould a person's

own ego after the fashion of one that has been taken as a "model" (11, pp. 62-63).

Freud's subsequent discussions of identification involve no new basic elements beyond those contained in the above early formulations, but his conception of the balance of forces making for identification shifts appreciably and culminates in a theory which is, in effect, differential for the two sexes. Specifically, in successive papers, Freud gives increasingly more emphasis to the fear of the punitive, castrating father as the primary force which brings about the resolution of the Oedipus complex and the development of identification. Witness the following passages from the essay on "The Passing of the Oedipus Complex" (5):

> The Oedipus complex offered the children two possibilities of satisfaction, an active one replacing the father and a passive one replacing the mother. . . . But now the acceptance of the possibility of castration, the recognition that women are castrated, makes an end of both possibilities. If the gratification desired in consequence of the love is to cost the child his penis, a conflict must arise between the narcissistic interest in this part of the body and the libidinal cathexis of the parent objects. Normally, in this conflict the first of these forces triumphs; the child's ego turns away from the Oedipus complex (p. 272).

> Analytic observation enables us to perceive or to infer in these connections between the phallic organization, the Oedipus complex, the threat of castration, the formation of the superego and the latency period. They justify the statement that the Oedipus complex succumbs to the threat of castration (p. 273).

As Freud is quick to recognize, the above line of argument has crucial implications for the development of the female. Since she is already "castrated," she presumably would have no incentive for identifying with the "aggressor" and thence developing a superego. This is precisely Freud's conclusion, which he elaborates, albeit somewhat apologetically, in his essay on "Some Psychological Consequences of the Anatomical Distinction between the Sexes" (14).

> In girls the motive for the destruction of the Oedipus complex is lacking. Castration had already had its effect, which was to force the child into the situation of the Oedipus complex. Thus the Oedipus complex escapes the fate which it meets with in boys; . . . I cannot escape the notion (though I hesitate to give it expression) that for women what is ethically normal is different from what it is in men. Their superego is never so inexorable, so impersonal, so independent of its emotional origins as we require it to be in men. Character traits which critics of every epoch have brought up against women—that they show less sense of justice than men, that they are less ready to submit to the great necessities of life, that they are more often influenced in their judgments by feelings of affection and hostility—all these would be amply accounted for by the modification in the formation of their superego which we have already inferred. We must not allow ourselves to be deflected from such conclusions by the denials of feminists, who are anxious to force us to regard the two sexes as completely equal in position and worth; but we shall, of course, willingly agree that the majority of men are also far behind the masculine ideal (pp. 196-197).

Perhaps more than any other Freudian assertions we have examined thus far, certain statements in the foregoing paragraph are subject to empirical verification. Also, we have probably gone far enough in our exposition of Freud's basic theory to begin to consider questions of fact. Despite their partisan character, Freud's views on psychological differences between the sexes are not entirely without scientific support. Witness the following summary statement from what is probably the most comprehensive and careful study of sex differences in personality carried out to date—that of Terman and Miles (30):

> The compassion and sympathy of the female . . . appears from the evidence personal rather than abstract, less a principled humanitarianism than an active sympathy for palpable misfortune and distress. In disgust, aesthetic judgment, and in moral censure, the evidence is rather for the influence of fashion and feeling than of principle or reason (p. 448).

But where do qualities of compassion and sympathy in the female come from? The absence of castration fears in the woman, though it may deprive her of the incentive to identify with the father, can hardly account for her identification with the mother. In his search for an alternative theory of identification for the female, one which does not rely primarily on identification with the aggressor, Freud returns to a conception implicit in his earlier thinking—namely, what we have called *anaclitic identification* or identification through loss of a loved object. In his own words:

> Fear of castration is naturally not the only motive for repression; to start with, it has no place in the psychology of women; they have, of course, a castration complex, but they cannot have any fear of castration. In its place, for the other sex, is found fear of the loss of love, obviously a continuation of the fear of the infant at the breast when it misses its mother. You will understand what objective danger-situation is indicated by this kind of anxiety. If the mother is absent or has withdrawn her love from the child, it can no longer be certain that its needs will be satisfied, and may be exposed to the most painful feelings of tension (8, p. 121).

The above formulation takes on prophetic qualities in the light of a series of recent research findings obtained independently by two groups of investigators. Working within a framework of learning theory rather than psychoanalysis, Sears, Maccoby, and Levin (28), in a study of child rearing practices in Boston suburbia, found that discipline techniques involving "withdrawal of love" were more frequently used with girls than with boys; whereas the reverse was true for methods involving physical punishment, threat, or deprivation of property and privileges. Moreover, the former techniques were appreciably more effective, in both sexes, for achieving socialization of the child and the "development of conscience." Children exposed to love followed by its conditional withdrawal tended to show less aggression and more guilt (as evidenced by confessions and "feeling sorry"); in contrast, the more the child was threatened with or subjected to physical punishment, the more aggressive was his behavior.

Striking confirmation for this same finding comes from the psychoanalytically-oriented research of Miller, Swanson, and their students (17). Working with families in the Detroit area, they found that boys whose mothers used psychological punishment (appeals to guilt, reasoning, or acting hurt) showed appreciably stronger evidence of guilt (as measured by a projective test) than boys who were punished directly by spanking or slapping. The latter, however, revealed more aggression both behaviorally and in projective tests.

The preceding studies have several important theoretical implications. First, they suggest that the two major mechanisms of identification proposed by Freud have relevance for differences in personality not only between the sexes but within the sexes as well. Such an inference is altogether consistent with Freud's own thinking. Thus, he points out (13) that the severity of the superego in the boy is a direct function of the degree to which "the father was hard, violent, and cruel." Moreover, even in his later formulations of the operation of the Oedipus complex in boys, he allows for the possibility of "an identification of an affectionate sort with the boy's father" (14) which presumably could lead to some measure of anaclitic identification. Analogously, the girl's identification is to some extent influenced by the Oedipus complex even though this influence is subordinated to the anaclitic relationship.

> The mother-identification of the woman can be seen to have two levels, the pre-oedipal, which is based on the tender attachment to the mother and which takes her as a model, and the later one, derived from the Oedipus complex. . . . But the phase of pre-oedipal tender attachment is the decisive one; it paves the way for her acquisition of those characteristics which will later enable her to play her part in the sexual function adequately, and carry out her inestimably social activities (8, p. 183).

Although the findings of Sears and his colleagues, on the other hand, and those of Miller, Swanson, and their students, on the other, are consistent with some aspects of Freud's later theories of identification, they appear to contradict others. For example, Freud's hypothesis of the more complete development of superego in men would seem to imply that guilt should be a more frequent and pronounced phenomenon in men than in women. Yet, both groups of investigators report exactly the opposite result. These findings suggest that it is anaclitic identification involving withdrawal of love which fosters the development of the superego whereas identification with the aggressor leads rather to the adoption of the aggressor's hostile outlook not only toward the self but toward the environment at large. Such an interpretation is consistent with Anna Freud's description of the mechanism as one in which the child attempts to defend himself against aggression and power by emulating the characteristics of the person wielding power. Similarly, Bettelheim's dramatic report (1) describing how the prisoners in Nazi concentration camps gradually adopted the dress, manner, and, above all, the sadistic methods of their guards and persecutors,

as well as Sarnoff's study (26) of the operation of the mechanism of identification with the aggressor among anti-semitic Jews, lends empirical support to the inference that it is hostility rather than guilt which is learned as the consequence of this mechanism.

At the same time, aggressive identification appears to require for its fulfillment a situation in which, to quote Sarnoff, "the victim is dependent upon the aggressor" and "cannot escape his influence." Thus, the prisoners in the concentration camp were not only unable to get away, but depended for their very survival on the whims of their captors, whether they gave food or withheld it, condemned one to the cremation chamber or not. In this same sense a child can be at the mercy of a hostile, punitive parent. Indeed, it is possible that neither kind of identification can occur unless the child is, in some sense, dependent on the parent. If the child comes to be dependent on love, then separation or withdrawal of love can lead to anaclitic identification and superego formation. If his dependence is one on survival and freedom from pain, then identification with the aggressor becomes the mechanism of choice. Finally, there is the possibility, indeed, the likelihood, that both processes operate simultaneously. The child is both loved and hated, and the balance between the two determines the course and character of identification. Perhaps, it is when love and hate are both maximized that there develops the extreme, self-punishing superego which Freud was so fond of describing as the virtually inevitable outcome of the boy's Oedipal conflict with his father. Such a conclusion would seem to be consistent with Freud's brilliant analysis of the self-destroying superego in his essay on "Dostoyevski and Parricide" (13).

One feature remains to be noted regarding Freud's theory of identification and superego formation. Although, even in his later writings, Freud continues to speak of identification as involving imitation of a model (8, 12), he now takes pains to emphasize that this model is not the immediate image which the parent presents to the child, but the ideal standard reflecting the parent's aspirations rather than his actual behavior. In Freud's words:

> In general, parents and similar authorities follow the dictates of their own super-egos in the up-bringing of children. Whatever terms their ego may be on with their super-ego, in the education of the child they are severe and exacting. They have forgotten the difficulties of their own childhood, and are glad to be able to identify themselves fully at last with their own parents, who subjected them to such severe restraints. The result is that the super-ego of the child is not really built upon the model of the parents, but on that of the parents' super-ego . . . (8, p. 95).

In the light of this statement, some research findings by Helper (15) are of interest. Working with a sample of high school pupils and their parents, this investigator compared the child's self-description with the parent's description of himself and the parent's ideal for the child ("Describe your child as you would most like him to be"). Helper found that the child's self-description was as similar to the parent's ideal for the child

as it was to the parent's self-description. In other words, the child comes to resemble not only what the parent is but what the parent wants the child to be.

In concluding our presentation of Freud's theory—or perhaps more properly, theories—of identification, we are faced with the problem of summarizing views which—in part because they are ambiguous, in part because they have changed over the years—are not always consistent with each other. One way of resolving the dilemma is to treat these views as alternative formulations. This is what we propose to do.

We may begin by distinguishing between two uses of the term identification in Freud's writing. Most often, as in his discussion of the Oedipus complex, Freud treats identification as a process—the sequential interplay of forces internal and external which impel the child to take on the characteristics of the parent. It is in this sense of process that the term identification is used when we speak of anaclitic or aggressive identification. In other words, these represent alternative developmental mechanisms derivable from Freudian theory.

But, on occasion, Freud also uses the term identification to describe the *product* or outcome of the process—the resultant similarity in the characteristics of the child and the model. Moreover, there is the further question of what aspects of the model are being emulated. At times, as in the example of the boy who identifies with a kitten by crawling about on all fours, refusing to eat at the table, etc., it is the overt behavior of the model which is being adopted. In other instances, as when Freud speaks of moulding "one's ego after the fashion of one that has been taken as a model," identification would appear to include internalization of the motives as well as the overt behavior of another. Finally, as we have seen, in his later writings it is not the parent's ego with which the child identifies but his superego, his idealized standards for feeling and action. In short, there are three aspects of the parent after which the child may pattern himself, the parent's *overt behavior*, his *motives*, or his *aspirations* for the child. Which aspect of the model is in fact identified with becomes, from our point of view, an empirical question. It seems probable that all three aspects are involved at one time or another. Or it may be that one process, such as anaclitic identification, is more likely to result in the emulation of standards, while another, such as identification with the aggressor, leads to the adoption of parental motives and acts. Still other possibilities will emerge once we consider subsequent elaborations of Freud's original theories.

Psychological Variants of Freud's Theory of Identification

Criticisms and modifications of Freud's theory of identification have been proposed by a number of present-day psychologists—notably Stoke (29), Mowrer (19), Sanford (25), and, most recently, Sears (27). For the most part, we find that these theorists underscore points with which we

are already familiar. Thus, Stoke, in a searching analysis of factors influencing identification, points to the importance of distinguishing between "behavioral identification," in which the child exhibits the same overt behavior as the parent, and "emotional identification," which refers to the emotional tie (for Stoke, always positive) between the child and the parent. Stoke also raises the question, as we have, "whether fear of physical punishment alone can build up an adequate super-ego," and relies on what we have called anaclitic identification to explain the development of conscience and guilt. Nevertheless, he explicitly rejects Freud's theorizing on the grounds that,

> it is not scientifically verifiable, is inconsistent in its applicability to boys and girls, fails to account for differences as well as similarities, . . . does not explain the discrepancies between the emotional and behavioral aspects of identification, . . . emphasizes organic causes to the virtual exclusion of others, and is not very useful in child guidance (29, p. 239).

A more charitable and optimistic view of the Freudian theory of identification is taken by Mowrer (19), who views it as an appropriate point of departure for the formulation of research hypotheses (20). On the basis of a comprehensive analysis of the treatment of identification by both Sigmund and Anna Freud, Mowrer, utilizing suggestions from the work of two of his students (3, 16), distinguishes two mechanisms of identification, *developmental* and *defensive;* "the one is powered mainly by biologically given drives ('fear of loss of love' in the analytic sense) and the other by socially inflicted discomforts ('castration fear' or, less dramatically, simply fear of punishment)" (19, p. 592). In short, here once again is the distinction between anaclitic and aggressive identification. Mowrer, however, regards the former as considerably less anxiety-provoking, and, therefore, less consequential for the formation of character. He states:

> Developmental identification, we may suppose, is a milder and simpler experience than is defensive identification, which has a violent, crisis-like nature. . . . The first presumably involves little conflict; but in the latter case, conflict and attendant anxiety are outstanding. . . . If a child were cared for but never disciplined, he would presumably show only developmental identification and would develop skills but no character (19, pp. 592-593).

At first glance, this view is somewhat surprising, particularly in the light of Freud's conclusion, in his essay on *The Problem of Anxiety* (9), that "The most basic anxiety of all . . . arises in connection with separation from the mother" (p. 76). Mowrer's position becomes more comprehensible, however, in the light of a subsequent exposition of "defensive identification."

> If a child has never known a normal degree of love during the infantile period, parental discipline produces comparatively little conflict. . . . But the case of the normally-loved child is different: the disciplinary demands of the parents cause him first of all to attack his parents (since their discipline

> frustrates him and he is too dependent to retreat from them), and when this behavior meets with still further punishment, he is likely to be thrown into *intolerable anxiety*.
>
> At this point, a most remarkable thing normally occurs. At the height of his conflict, the child discovers that he can satisfy his parents and at the same time, still his own inner turmoil if he will only do one thing: accept the standards of conduct and social values which his parents are holding up to him and make them *his* standards and *his* values. . . . In common parlance, we say that the child now has a conscience or that, in the language of psychoanalysis, his *superego* has begun to function. . . . the induction stands that character, conscience, or superego (the term is not important) is forged as a solution to the unbearable conflict generated during the period of "intensive" socialization by the great love for and equally great fear (and/or hatred) of the parents (20, p. 72).

As Sanford has so aptly pointed out in a recent paper (25), Mowrer's "defensive identification" is actually "developmental"; that is, it is impelled by that "fear of the loss of love" which Mowrer designates as the hallmark of "developmental identification." Sanford himself prefers the term "introjection" for the latter mechanism and reserves identification for describing, among other phenomena, what we have called aggressive identification. Sanford argues that the lasting effects of this latter type of mechanism are "frequently overestimated" and "that the process by which figures of the environment become models for response readiness in the deeper layers of the personality, as in superego formation, is not defensive identification but introjection . . ." (25, p. 112). From our point of view, the question of which mechanism is the more powerful cannot be settled by *a priori* argument. As we have indicated, the theoretical issue, which is an important one, can ultimately be resolved only through empirical investigation.

Both Mowrer and Sanford, then, though they employ their own terminology, may be said to follow Freud in postulating two different mechanisms of identification. Both these theorists, however, depart from Freud's thinking in other respects. Thus, Mowrer takes issue with Freud's basic notion that sexual object choice precedes rather than follows identification. Mowrer writes:

> Freud is correct in noting the difficulties connected with his view of psychosexual development, but he never made what would seem to have been a most natural alternative assumption, namely, that the love a child first develops for his parents is such as to lead to identification and that object choice *follows as a secondary result*. Thus, when a little boy begins to experience libidinal impulses he will, if already he has become firmly aligned with his father and with men in general, be strongly disposed to direct these impulses toward women, in keeping with the model provided by his father; and the little girl, in identifying with her mother, will tend, like mother, to take men as sex objects (19, p. 607).

Mowrer's reversal of the traditional Freudian sequence is of particular interest since it leads him to a theoretical position, which, as we shall see, is very similar to that of the sociologist Parsons. For purposes of subsequent comparison, we quote the relevant portions of Mowrer's exposition of his "alternative view":

. . . Because Freud assumed that object choice is primary and identification derived therefrom, he believed that the psychosexual development of boys is simpler than that of girls, since boys can at an early date take women as sex objects and retain them as such throughout life; but girls, Freud conjectured, having, like the boys, taken the mother as the first sex object, must later abandon this object choice in favor of men and assume instead an identification relationship with the mother and with women generally. The alternative hypothesis here suggested holds that the situation is the reverse. Because the infant's first experiences of care and affection are with the mother, we infer . . . that there will be a tendency for children of *both* sexes . . . to identify with the mother. This provides a path of development which the female child can follow indefinitely; but the male child must, in some way, abandon the mother as a personal model and shift his loyalties and ambitions to his father. Once the boy and the girl are securely aligned with the mother and the father, respectively, *in terms of their basic character structure,* then, as specific sexual needs arise, they can be handled along lines prescribed as correct and proper for members of their particular sex.

However, we must not neglect to consider the question of how it is that the boy, whose primal identification is ordinarily with the mother—for example, mothers almost certainly play a greater role in their infant's learning to walk and talk than do their fathers—how it is that the boy eventually abandons the mother as his personal guide and takes instead the father. Here we have few facts to guide us, but we may plausibly conjecture that the first identification which infants make with mother figures is *undifferentiated.* By this I mean that the small child probably first comes to perceive the mother, not as a woman who is distinct from men, but simply as a human being, different in no systematic way from other adult figures in the environment. The personal characteristics which are acquired through identification with, or imitation of, the mother during this period are characteristics or accomplishments which are appropriate to *all* persons, male and female alike. It is only at a later stage, presumably, that the child becomes aware of the partition of mankind into two sexes; and it is then that the father, who has played a somewhat subsidiary role up to this point, normally comes forward as the boy's special mentor, as his proctor, guide, and model in matters which will help the boy eventually to achieve full adult status in his society, not only as a human being, but also in the unique status of a *man.* This, we note, involves two things: (1) being a man in the sense of being honorable, reliable, industrious, skilful, courageous, and courteous; and (2) being a man in the sense of being masculine, i.e., sexually oriented toward members of the opposite sex (19, pp. 607-608).

In short, Mowrer suggests that the series of identifications through which the child passes involves the progressive differentiation of social objects first with respect to age, and then to sex. It is this notion of sequential differentiation (apparently arrived at quite independently) which becomes the core of Parsons' theory of identification.

Sanford departs from the classical Freudian position in still another direction. He emphasizes the possibility—indeed, the likelihood—that the parental love or punishment need not necessarily result in "internalization" of the parent's attitudes; rather they may simply reinforce behavior directly, in accordance with familiar learning principles. He states:

. . . we should consider that normal character development can be largely explained, without benefit of either identification or introjection, on the

> basis of common forms of learning. A child learns which of his actions please, and which displease, his parents, which win him love, which disapproval, he learns what reactions are effective in inhibiting those impulses which if allowed free rein would lead to catastrophe, he learns how to regard himself from the way others regard him, and in building his ego system and his self-conception he learns what to keep and what to discard (25, p. 117).

In other words, Sanford proposes yet another, at once more simple and more general mechanism to account for the child's adoption of parental characteristics. The process is the familiar one of learning through reinforcement by punishment and reward. The classic theoretical treatment of the role of reinforcement in inducing one person to behave like another in response to similar cues is that of Miller and Dollard (18). These authors, however, make only passing reference to the concept of identification. Having defined copying as behavior in which "one person learns to model his behavior on that of another" and "knows that his act is an acceptable reproduction of the model act," Miller and Dollard state tentatively:

> It is possible that a mere detailed analysis would show that the mechanisms involved in copying are also involved in that aspect of character, or superego, formation which the Freudians have described as "identification" (18, p. 164).

They then suggest, in a footnote, that identification is likely to vary as a function of the degree to which the model (e.g., the parent) is a "loved or prestigeful person."

This suggestion is, in effect, followed up in the previously mentioned research by Helper (15). Working in the framework of reinforcement theory, Helper found, for example, that a boy is more likely to describe himself as similar to his father (and to aspire to his father's ideals for him) if the mother approves of the father as a model for the child. Both sexes were also more likely to emulate characteristics of the mother when the mother approved of herself as a model.[1]

In short, in addition to its other meanings, the term identification has been equated, theoretically and empirically, with "common forms of learning." Under these circumstances, one may legitimately ask whether the concept has any scientific utility and whether it might not better be abandoned. This is precisely the conclusion reached by Sanford, who writes:

> A term that can be employed in so many different ways and that . . . has been accepted by most psychologists and sociologists, could hardly mean anything very precise. It might be proposed, quite seriously, that we give up the term "identification" altogether. When we are describing social behavior and have the impulse to say "identification" we must in any case

[1] The father's approval of the mother or of himself, however, showed no relation to the child's perceived similarity with the characteristics or ideals of either parent. We shall consider the implication of this parental difference in our discussion below of Parsons' theory of identification.

> specify "what kind"; if we go a step further and say just what we mean, it will almost always turn out that other words are available, and that they are, in fact, more accurate. . . . In other words, why not agree that identification is not an explanatory concept, and that as a descriptive one it is too vague to be useful (25, p. 107)?

The argument is persuasive, but—in this writer's judgment—nevertheless mistaken. Admittedly, one could speak of the child's learning of parental behavior, motives, or standards without invoking the term identification. And, if a concept is needed to describe the product of such learning, one could employ some simple but noncommital expression as "acquired similarity." It would also be possible to examine the effects of parental aggression, withdrawal of love, or direct punishment and reward on the child's learning of parental characteristics. What would be lost by a recasting of the problem in such more specific terms?

In this author's view, we would risk losing sight of an important psychological phenomenon, as well as an intriguing theoretical issue—a phenomenon and issue first recognized, however dimly, by Sigmund Freud. In concerning himself with identification, Freud was not asking why and how a child might learn an isolated piece of behavior from his parent. He was interested in what he felt to be a more sweeping and powerful phenomenon—the tendency of the child to take on not merely discrete elements of the parental model but a total pattern. Moreover, as Freud saw it, this acquisition was accomplished with an emotional intensity which reflected the operation of motivational forces of considerable power. These features of pattern and power are reflected in his use, as virtual synonyms for identfication, such terms as introjection and incorporation—words which connote a sudden and somewhat desperate "swallowing whole" of the parent figure.

In short, psychoanalytic conceptions of identification should not simply be equated with any acquisition by the child, through ordinary learning, of characteristics of his parent. Freud's formulations have at least two distinguishing features which, though they may be expressible in terms of learning theory, are hardly conventional attributes of it. First, these conceptions clearly imply the existence of *a motive in the child to become like the parent*. Second, this motive functions in relation not to isolated elements but to a total pattern or Gestalt.

Similar conclusions regarding the defining properties of identification have been reached by at least one learning theorist. Sears (27) has recently published a theoretical paper in which he defines identification as "a secondary motivational system for which 'acting like the mother' is the goal response" (p. 154). This motive gives rise to behavior in which the individual acts "like another person," but such learned activity can be distinguished from conventional learning by the absence of specific training. In Sears' words:

> Children of two years and older have a tendency to act in a number of ways like their parents. They adopt parental mannerisms, play parental roles,

> and in the later preschool years seem to incorporate in their own value systems many of the values, restriction, and ideals of the parents. That is to say, they develop a conscience. It is the apparent "absorption" of these characteristics without specific training, either by direct guidance or by reward and punishment, that leads to the hypothesis of a process (identification) that short-cuts the direct training process. It is as if the child had learned a general principle "to be like my father and mother." He then incorporates many of their psychological properties without, in each instance, appearing to receive overt rewards for doing so (27, p. 152).

Though the language is that of behavior theory rather than psychoanalysis, Sears' views strike us as highly consistent with Freud's original conceptions. The parallelism is even more marked in Sears' exposition of the antecedents of identification. He begins with the familiar argument that the child's initial biological dependence on the mother inevitably becomes psychological—or, in his terminology, it "produces, in the infant, a secondary drive system of dependency-on-the-mother." Then,

> . . . since it is being assumed that the child does not discriminate between himself and his mother, the perception of *her* actions becomes an integral part of *his* action sequences just as much as his own actions do.
>
> If the mother is absent on some occasion when drive stimuli occur and start off one of the child's action sequences, he will attempt to perform those parts of the total sequences for which his mother was normally responsible. . . .
>
> . . . occurrence (of imitation) in a child with dependency drive for which the mother's actions are the appropriate rewards will permit the child to reward himself. That is, when he is motivated to secure the mother's nurturing responses, he can imitate her affectionate attitudes and gestures himself and hence secure at least partial gratification of his dependency drive.
>
> One consequence suggested by this formulation is that the degree of identification of the child with his mother should bear a curvilinear relationship to the amount of affectionate nurture the mother gives. If she is universally present and always plays a part in the dyadic mother-child sequence, the child will never have occasion to perform mother-acts, i.e., to establish identification. On the other hand, if she is continuously punitive, and is rarely associated with the satisfying completion of the child's goal striving, her acts will have no part in his action sequence, and there will be no initial instigation to act like her (27, pp. 154-155).

Clearly, what Sears has ingeniously accomplished here is to restate in the language of learning theory Freud's theory of anaclitic identification. Does this mean that in our review of psychological variants of Freudian theory we have merely come the full circle? Not altogether, for we have achieved new clarity on a number of points. Most notably, among the many phenomena to which the term identification has been applied, we have found one which cannot readily be subsumed under more conventional or simple rubrics: this is the notion of a generalized motive on the part of one person to take on the characteristics of another as a total pattern. To this new insight, we can now apply generalizations reached earlier in this analysis. Thus, we have at least two theories, both Freudian in origin, to account for the existence of such a mechanism: the first involves defense

against an aggressor by emulating his characteristics; the second, a response to an absent or depriving loved person by seeking to replace him, as it were, in one's own behavior. We have seen that the second of these developmental processes, and probably the first as well, can be restated in terms of present-day learning theory. Finally, taking a cue from Miller and Dollard's theory and Helper's research findings, we can conceive of still another mechanism, derivable from learning theory, which could account for the development of a general motive to become like another. If the parent is a "loved and prestigeful person" whom the child is rewarded for emulating, such emulation could become a need in its own right through secondary reinforcement.

In one important respect we have yet to modify our earlier reasoning. If the core of the concept of identification is a *motive* to become like another person, then the presence of similarity is, at best, only a by-product rather than an essential feature of the phenomenon. Indeed, as the writer has argued elsewhere (2), one could take the position that the stronger the desire to become like another, the more one is likely to exaggerate or distort the characteristics of the model. Perhaps, Freud had this possibility in mind in asserting that the child's superego is modeled not after the parent as he is but after the "parental imagos," the child's exaggerated and distorted perceptions of his parents. Here again we find ourselves confronted with the still unsettled question of the *content* of identification. Granted that the child is motivated to acquire some patterned aspects of the parent, just what aspects are involved? How are they organized both in form and content? Although some light can be thrown on this issue from the perspective of psychological theories of identification, it is Parsons' sociological formulation which casts it into sharpest relief.

Parsons' Sociological Theory of Identification

Parsons admittedly takes Freudian theory as his point of departure. Accordingly, before examining Parsons' elaborations of the now familiar psychoanalytic position, we take note briefly of the major points of convergence in the two approaches. First, the generalized motive to become like another stands, with Parsons as with Freud, at the core of the concept of identification. Thus, in *Toward a General Theory of Action* (24), the following distinction is drawn between identification and imitation:[2]

> The two major mechanisms for the learning of patterns from social objects are *imitation*, which assumes only that alter provides a model for the specific pattern learned without being an object of generalized cathectic attachment; and *identification*, which implies that alter is the object of such an attachment and therefore serves as a model not only with respect to a specific pattern in a specific context of learning but also as a model in a generalized sense. Alter becomes, that is, a model for general orientations, not merely for specific patterns (p. 129).

[2] The same distinction is made in *The Social System* (21, p. 211).

Similarly, if we interpret it correctly, Parsons' theory of the antecedents of identification is a restatement, in still another and even more esoteric language, of the now familiar stages of the anaclitic process. He takes as his point of departure the four-phase "paradigm of social control" originally proposed in *The Social System* (21, pp. 300-326) and further elaborated in the *Working Papers* (23, pp 238-245). Applying his conceptual scheme primarily to the therapeutic process, Parsons distinguishes four sequential stages: *permissiveness* ("allowing the patient to express himself"); *support* ("to tolerate the excessive demands of the patient and 'accept' him as a human being"); denial of *reciprocity* ("the denial of response-reward, including . . . gratification in being duly punished for an aggressive act"); and *manipulation of rewards* ("a process of reinforcing 'reality oriented' adaptive instrumental performance"). In the volume on the family (22), Parsons offers this same four-phase sequence as the basic foundation for his theory of socialization and, more specifically, identification. Thus, he asserts that in her treatment of the child, the mother begins with permissiveness and support which develop in the child "a diffuse attachment to *her*, a *dependency on her*" (italics Parsons'):

> We may presume that once dependency in this sense has come to be well established, the demands for attention, and for specific acts of care expands. The child manifests what, from the point of view of the mother's standards of child care, are illegitimate positive wishes. He is waked up at certain times though he would rather be allowed to sleep, he is given only so much to eat, less than he wants, he is put down when he would like her to continue to fondle him, etc. Whereas his dependency in general is welcomed and rewarded, excessive manifestations are pruned off by denial of reciprocity. . . . The balance between denial of reciprocity and positive reward gradually leads to the establishment of a stable "orientation" or expectation system in the child, the organization of his behavior both around the relation to the mother as an object and involving certain *standards* of what are and are not legitimate expectations of his own gratification and of her behavior. When this process has reached a certain stage we can speak of the internalization of the mother as an object as having taken place. . . . This internalization is what Freud meant by ego's primary identification (22, p. 65).

Where then does Parsons diverge from Freud? Principally on the question of content, of what is internalized. The specific issues are raised in Parsons' essay on the superego (23, pp 13-29). The sociologist differs with the psychoanalyst on three major counts: First, Parsons criticizes Freud for failing to recognize that identification results in the internalization not only of moral standards (the superego) but also the cognitive and expressive features of the parent and through him of the culture as a whole.

> The general purport of this criticism is that Freud, with his formulation of the concept of superego, made only a beginning at an analysis of the role of common culture in personality. The structure of his theoretical scheme prevented him from seeing the possibilities for extending the same fundamental analysis from the internalization of moral standards—which he applied to the superego—to the internalization of the cognitive frame of reference for interpersonal relations and for the common system of expressive

> symbolism; and similarly it prevented him from seeing the extent to which these three elements of the common culture are integrated with each other (23, pp. 20-21).

In a second and derivative challenge, Parsons takes exception to what he regards as an exclusively constitutional basis for Freud's theory of sexuality.

> . . . Freud speaks of the original "bi-sexuality" of the child. The presumption is that he postulated a constitutionally given duality of orientation. In terms of the present approach, there is at least an alternative hypothesis possible which should be explored. This hypothesis is that some of the principal facts which Freud interpreted as manifestations of constitutional bisexuality can be explained by the fact that the categorization of human persons—including the actor's categorization of himself as a point of reference—into two sexes is not, except in its somatic points of reference, biologically given but, in psychological significance, must be learned by the child. It is fundamental that children of both sexes start life with essentially the same relation to the mother, a fact on which Freud himself rightly laid great stress. It may then be suggested that the process by which the boy learns to differentiate himself in terms of sex from the mother and in this sense to "identify" with the father, while the girl learns to identify with the mother, is a learning process. One major part of the process of growing up is the internalization of one's own sex role as part of the self-image. It may well be that this way of looking at the process will have the advantage of making the assumption of constitutional bisexuality at least partly superfluous as an explanation of the individual's sex identification. In any case it has the great advantage of linking the determination of sex categorization directly with the role structure of the social system in a theoretical as well as an empirical sense (23, pp. 21-22).

In the light of our own analysis of Freud's theories of identification, we are inclined to doubt Parsons' contention that Freud overlooked the possibility of learning as a mechanism in the development of sex identity. But, by now, the reader is in a position to judge the merits of the case for himself. Parsons' final contention in the above quotation, however, can hardly be challenged. Certainly Freud has not linked "the determination of sex categorization directly with the role structure of the social system." Parsons' third and major criticism of Freud focuses around this very issue and becomes the major theme of the sociologist's complex revision and extension of Freudian theory in the volume on *Family, Socialization and Interaction Process* (22). Here Parsons states:

> Freud was clearly very much on the right track, and in fact gave us the foundations of the present view. But what Freud lacked was a systematic analysis of the structure of social relationships in which the process of socialization takes place. It is this which we are attempting to supply (22, p. 104).

A prolonged effort on the part of this writer to extract the elements of the Parsonian analysis convinces him that the word "systematic" in the above quotation is being used in a truly Pickwickian sense. Adding to the usual difficulties of Parsonian prose (indeed it must be parsed to be under-

stood) is the fact that the theory is stated at considerable length not once, but twice—once by Parsons alone (Chapters II and III); and again by Parsons and Olds jointly (Chapter IV), employing a somewhat different set of concepts. The basic features of the two formulations, however, are highly similar. The fundamental notion is that the child passes through not one but a series of identifications. The nature of these successive identifications is determined by the reciprocal roles being taken by parent and child at successive stages of the child's development. To understand these stages, however, we must first take cognizance of the familiar Parsonian polarity of expressive vs. instrumental function. The former, associated primarily with the mother, involves being "affectionate, solicitous, warm, emotional to the children" and serving as "the mediator and conciliator of the family." In contrast, instrumental activity refers primarily to "establishing the desired relations to external goal objects" (e.g., working at a job) and acting as "the final judge and executor of punishment, discipline, and control over the children of the family." Parsons' distinction between parental roles seems to parallel fairly closely Freud's descriptions of the nurturing mother and the punitive father. But one important difference may be discerned. The father's role, while involving discipline and control, is not predominantly hostile; it is also, and perhaps primarily, adaptive and directed at manipulation of the environment.

To return to the problem of developmental stages, Parsons emphasizes that at the outset the young child cannot respond to the parental roles in their fully differentiated form. Moreover, the parental behaviors to which the child is exposed are segmental and not representative of the full role-repertoire of each parent. For example, in the beginning the mother's function is primarily instrumental; she gives the child physical *care*. Since care is not always forthcoming, this "denial of reciprocity" leads the child to his first identification—"the internalization of the mother . . . *in her role as a source of care*." Parsons emphasizes that "it is not the mother as a total personality as seen by adults that has been internalized, but that aspect of her with which ego has stood in a meaningful relationship of interaction" (22, p. 65). Moreover, since for Parsons a role always implies a reciprocal relationship, the denial of reciprocity leads to an identification not only with the mother as an agent of care but also with a primordial image of the child himself as "the object of care."

Herein lies the crux of Parsons' theory of the content of identification. At any given stage, the child identifies not with the parent as a total person but with the reciprocal role-relationship that is functional for the child at a particular time. Parsons stipulates a specific sequence of such role-relationships. Following his identification with the mother as a source of care, the child enters the stage of "love dependency" in which the mother's expressions of affection become rewarding in and of themselves; in other words, the child becomes responsive to the "expressive" aspects of the mother's function. Since "a mother's love . . . is always conditional," the

denial of reciprocity at this level leads to internalization of the mother as a giver of love and of himself as a loved object.

Identification at the third or Oedipal stage reaches a new level of complexity. It is important to recognize, Parsons asserts, that at both earlier levels of identification the mother is still undifferentiated with respect to sex. It is only in the Oedipal phase that the child first recognizes and internalizes the distinction between male and female, again simultaneously both in relation to his parents and himself.

> . . . the crucial event of this phase is the first stage of the assumption by the child of his sex role. The pre-oedipal child is, we assume, in the sense of fundamental personality constitution, sexless—as is in literal terms the "mother," since we assume that *for the child* the differentiation of the two parents as objects by sex has not yet on the requisite level been internalized. . . . In the earlier phases there was only *one* ascribed role the child could assume—more or less satisfactorily. Now he must "choose" between *two*—though the pressure to choose the ascriptively right one is overwhelmingly great (22, p. 78).

Once more the differentiation occurs because of a shift in the parental role pattern presented to the child. Specifically, the expressive and instrumental functions are now divided between the parents with the mother specializing in the former and the father in the latter.

> . . . in the mother-child system it was the mother who played the predominantly instrumental role, whereas in the wider family system, of which the mother-child is, it will be remembered, a sub-system, it is the father. . . . This is to say that the father is, symbolically at least, the primary source of the new "demands" for conformity and autonomous performance. The mother, on the other hand, this time as distinct "person," remains the primary source of "security" or "acceptance" in the love-relationship (22, pp. 79-80).

> Before he has internalized the father as an object the child cannot be fully sensitive to his attitudes as sanctions. He can, however, be motivated to do things which please *both* mother and father and be rewarded by mother's love and nurturance. By some such process he comes to cathect the father—because mother loves father and backs him up—and from the generalized parental object then a qualitatively different object can be differentiated out (22, p. 81).

The above view is nicely in accord with the previously-cited finding of Helper that it was approval of the parental model by the mother, and not by the father, that predicted the extent to which the school-age child accepted this model for himself.

Although the division of expressive-instrumental functions between mother and father provides the child with a basis for differentiating the parents with respect to sex, it does not account for the selection of the appropriate sex-role by the child. Having minimized the influence of constitutional factors, Parsons relies for an explanation on what is, in effect, a theory of differential reinforcement for the two sexes. He states, "The

new 'demands' of course this time are differentiated by sex. They consist in the appropriate forms of behavior for a 'big boy' and a 'big girl' respectively . . ." (22, p. 80).

As Parsons describes it, identification at the Oedipal level is analogous to but nevertheless different from its manifestations at earlier stages. First, although the point is not made explicit, we may note that, while at earlier levels the child was described as internalizing the parent's overt behavior, at the Oedipal stage he is seen as motivated to identify not so much with what the parent himself does as what the latter regards as "appropriate." Implicit in this shift over successive developmental levels is an answer to the hitherto unresolved problem of whether identification refers to the parent's actual behavior or to his aspirations for the child. Parsons would seem to be suggesting that both are involved, but at different stages of development. At an early age level the child is able to identify only with the most concrete actions of the parent directly relevant to the child's well-being, and even then the identification is of a diffuse and relatively undifferentiated type. Later, with increasing capacity to abstract and discriminate, the child becomes capable of internalizing patterns which are at once more subtle and symbolic. Accordingly, if the parent "denies reciprocity" and "manipulates rewards" in relation to the symbolic aspects of the parent-child relationship (such as the child's conformity with parental standards), then it is this more abstract reciprocal role pattern which becomes internalized.

To put it in another way, Parsons' successive levels of identification represent a progressive differentiation of ever more complex role-relationships between the self, parent, and, ultimately, society. As in classical developmental psychology, the earlier differentiations are more diffuse, less stable—the later more specific and enduring. It follows that even though the same objective person serves as the model, the mother with whom, say, the girl identifies in infancy is quite different—both in her formal and substantive properties—from the mother internalized as an outcome of the Oedipal conflict. It was Freud's failure to recognize this distinction, Parsons asserts, which accounts for much of the ambiguity in the former's theory of identification.

> Returning to problems closer to the field of socialization, we may next raise again some of the questions involved in the concept of "identification." This has of course been a notably ambiguous and controversial concept in the literature of the field. Perhaps we can suggest some of the sources of the difficulties and a constructive way out of them. Freud, it will be remembered, introduced the concept in connection with what, above, we have called the "mother-child identity." The principal difficulty seems to arise from the attempt to use the same concept in relation to the processes which go on in the oedipal period, above all with reference to sex-role assumption. Thus a boy is often said to "identify" with his father at this period and a girl with her mother.
>
> In our opinion the trouble comes from sticking to the attempt to deal only with the relation to *one* role-personality in a situation where multiple role-relations are already involved. In the case of "primary" identification there was only one object, the nurturing or "caring" mother. Identification

with this object could be treated as an adequate focus of the total internalization process. From the child's point of view, in the significant sense, he and the mother become one.

When it comes to the oedipal period, on the other hand, for the boy his father is only one of four basic types of object. . . .

What happens, then, is the reorganization of the total personality as a system. This involves the addition, *by fission,* of two new object-units, the father as discriminated from mother and the discrimination of ego from sibling of opposite sex. There is also a differentiation of the collectivity structure from the simple mother-child "we" to a familial "we" with six potential elementary sub-collectivities. The focus of a son's identification with his father is his self-categorization as belonging to the "we-males" sub-collectivity —which is the same thing as saying that he and father share the category of "maleness." It means that this we is set over against a "they" of the females to which he *cannot* belong. But there is another they to which he also cannot belong, namely that of the "parents"—in *this* nuclear family—and his father does belong to this one. In this sense the boy cannot identify with, i.e., play the role of, his father, but only with his brother if any, and with respect to generation, not sex, his sister. It is, however, profoundly true that in this process *both* boy and girl internalize the father as an object. *This* aspect is strictly parallel with internalization of the mother in the primary identification, but the others clearly are not parallel, for the simple reason that in a one-unit system there are no analogies to many features of a four-unit system. . . .

We suggest that the term identification has tended to be used to designate a variety of these different aspects of the total complex, but that the complex as a whole has not been adequately analyzed. We can suggest a usage of the term which is free of ambiguity, namely that identification should designate the process of internalization of any common collective "we-categorization" and with it the common values of the requisite collectivity. In this meaning of the term, in the oedipal phase of development a child undergoes not one but *three* new identifications. Two of them are common to members of both sexes, namely internalization of the familial we-category, and of the sibling category, namely "we children." The third, by sex, differs for children of each sex, in this third sense the boy identifies with his father, the girl with her mother (22, pp. 91-93).

As the reader may have already recognized, Parsons' reformulation of Freud's theory of identification is remarkably similar to the previously-cited revision by Mowrer. The parallelism is even more clearly apparent in Parsons' views on the differences between the sexes in the resolution of the Oedipus complex (22, pp. 98-99). Like Mowrer, he argues that Freud was wrong in believing that the resolution is more difficult for the girl than for the boy.

Parsons goes beyond Mowrer, however, in one important respect. He points out that the child in identifying with the parent of the same sex begins to exhibit behavior which is sex-typed but by no means identical with behavior of the adult parent. The discrepancy, Parsons asserts, is more marked for the boy and is related to two factors—the clarity of the role model and the degree of anxiety generated by the very conflict which motivates the child to seek a new identity.

> The boy . . . tends to attempt to act out what are symbolic representatives of the instrumental aspects of adult masculine roles. These are notably

> nonfamilial in content. He plays with trains, cars, airplanes. He more or less explicitly assumes relatively tangible adult masculine roles such as fireman or soldier. He puts great emphasis on physical prowess. But his play is a less exact copy of the specific father role than his sister's is of the mother. This may well be explained, partly at least, by two facts. First the mother role is far more uniform than the masculine occupational role; the girl has a rather specific role-model stereotype. Secondly, being, as we have suggested, under less acute strain, the girl is less driven to the kinds of symbols which tangibly express compulsively tinged sex-qualities. Thus both the difficulty of understanding many middle-class occupations—their remoteness, and the fact that not involving physical prowess or skills, they do not patently symbolize masculinity—may prevent the urban middle-class boy from so directly emulating his father as the girl does her mother. . . . (22, p. 100).

Here Parsons' argument is reminiscent of Freud's statement that the child identifies not with the parent as he actually is but with the parental *imago,* an image distorted in part by the child's own anxieties and needs. Indeed, taking Parsons' writings on identification as a whole, it is difficult to discern much that is fundamentally new beyond the terminology. Although he points emphatically to the need for revising and expanding Freud's theory in several directions, his own efforts in these directions fall far short of the expectations he creates; for, either he restates in even less precise language ideas that are already familiar in the writings of others or he offers conceptions which, though provocative, are so diffuse that the basic tasks of theory construction have to be performed by the reader himself. Accordingly, it is perhaps merely a reflection of this author's limitations as a theorist that after earnest and repeated perusal of Parsons' writings on identification, he has had little success in deriving formulations that substantially modify or clarify existing theories in this sphere. Specifically only two ideas emerged from this analysis which, to the writer's knowledge, are not found in earlier treatments of identification. Both of these derive from Parsons' distinction between instrumental and expressive functions and the differential allocation of these two functions between the parents. If, as Parsons suggests, withdrawal of love can be used as a technique for motivating the child to identify with the instrumental pattern of moving out into and manipulating the environment, then perhaps we have an explanation for the apparent contradiction, noted earlier, between Freud's thesis of superior development of the superego in men (together with the partially supporting data of Terman and Miles) and the finding from two independent studies of child rearing practices that guilt feelings are more common in females than in males. The crucial factor may lie in the sphere of activity with which the superego is concerned. Both studies of child training dealt with guilt in a context of intimate interpersonal relationships, one being concerned with mother-child relationships and the other with relationships within the family and between a child and his teacher. In contrast, Terman and Miles based their conclusions on items dealing with general behavior (e.g., discourtesy, laziness) and broader social issues (e.g., "being an atheist"). Perhaps male morality is more concerned with gen-

eral principles of conduct in relation to the outside world, while female morality centers about personal feelings and intimate interpersonal relationships. Such variation in the content or focus of the superego could be produced through the use of withdrawal of love in two somewhat different contexts. Thus, with girls this technique might be employed principally with reference to intimate family relationships, with boys more in regard to performance and achievement both within and outside the home. Finally, since the fathers, who are presumably instrumentally and externally oriented, are likely to have closer associations with sons than with daughters, boys would be more likely to develop a principled and objective (situation-oriented) superego. In contrast, girls—who, according to the findings of Sears, Maccoby, and Levin, are particularly likely to be subjected to withdrawal of love by the mother—would tend to develop a superego highly susceptible to guilt over interpersonal matters rather than broader issues.

Parsons' picture of the father as executive rather than punitive suggests also a variant of Freud's theory of identification with the aggressor. The fact that the father exercises power and control over the environment may in itself invite emulation. To the extent that an exploratory or activity drive exists (perhaps differentially for the two sexes), a living example of patterns of action for expressing this drive may be sufficient to motivate the child to adopt an analogous pattern in his own behavior. Given the possibility of such a mechanism, a child whose father, or mother, was especially active in the manipulation of the environment, either through direct activity, or through the exercise of power (e.g., making plans, decisions, etc.) might be expected to emulate the parent's behavior, even without reinforcement through "denial of reciprocity" and "manipulation of rewards."

But we have wandered far from the Parsonian orthodoxy, if such there be, and must return to our consideration of his own explicit views. Staying at the very general level at which he has chosen to couch his formulations, we may summarize the major tenets of his position as follows:

First, Parsons makes explicit the thesis that the type of identification is a function of the developmental capacities of the child. Early identifications are more diffuse and related to concrete behavior; later ones are more differentiated and organized around symbolic role-entities. Second, Parsons stresses repeatedly that identification involves not only motivational but cognitive elements; the cathected pattern is determined in part by the substantive and formal properties of the model. To put it in another way, what the child strives to internalize will vary with the content and clarity of the reciprocal role relationship in which he is a participant.

From Theory to Research

We have now concluded our analysis of Freudian theories of identification and their psychological and sociological derivatives. Where does this analysis leave us? We have hardly achieved any new theoretical insights.

Nor can we offer a synthesis of the diverse conceptions that have emerged from our survey. Perhaps the most we can hope to have achieved is a clarification of concepts and a clearing of the way for empirical work.

Specifically, our analysis calls attention to the importance of distinguishing three broad classes of phenomena to which the term identification has been applied, on occasion by one and the same theorist.

1. *Identification as behavior.* Here the emphasis is on overt action: A behaves in the manner of B. But even within this restricted context, the concept is used in at least three different ways. Most commonly, identification implies actions of A learned through taking as a model the overt actions of B. Less frequently, the term is used more loosely to refer to similarity of A to B without regard to whether B's behavior had actually served as a model (e.g., A is reinforced for acquiring aspects of his father's behavior which he himself never sees). Finally, there is identification in overt behavior with an ideal standard never actually exhibited ("Don't do as I do; do as I say.").

2. *Identification as motive.* When employed in this sense, identification refers to the *disposition* to act like another. Again the model may be overt behavior or an idealized standard, but there is no necessary correspondence between the actual behaviors of A and B, since, in his efforts to emulate, A may exaggerate or distort the characteristics of the model.

3. *Identification as process.* For the most part, Freudian theory and its derivatives deal with identification neither as behavior nor as motive but as a mechanism through which behavior and motives are learned; that is, theories of identification deal primarily with the psychological forces that impel the child to emulate a model. In the course of this analysis, we have distinguished or derived at least four such processes. Specifically, in addition to the basic Freudian mechanisms of *anaclitic* and *aggressive* identification, we have called attention to two additional possibilities. First, from Miller and Dollard's theory and Helper's research results, we extracted the simple hypothesis that conventional reward and punishment, without the necessity of specific reliance on frustrations implicit in either the *anaclitic* or *aggressive* mechanisms, might be sufficient to impel the child to emulate the parent. Finally, from Parsons' conception of an "instrumental" rather than "punitive" father role, we arrived (admittedly by an un-Parsonian chain of reasoning) at the notion that exposure to a model who exhibits effective mastery of the environment might, through capitalizing on an already existent activity or exploratory drive, stimulate the child to adopt the father's "adventurous" pattern of activity.

When the theoretical conceptions outlined above are examined in the light of available research data, the conclusion is inescapable that the theories have grown all out of proportion to the facts. They offer elaborate and intricate explanations for phenomena presumed to be common if not universal; yet, the evidence for the prevalence or even the sheer existence of these phenomena is extremely sparse. Thus, to the writer's knowledge,

there have as yet been no attempts to investigate empirically the presence of a generalized motive in the child to become like one or the other parent. Similarly, at the level of process, although existing theories assume that boys and girls are treated differently by the parent of each sex and that this differential treatment has markedly diverse effects on the child of each sex, actually very little is known about the extent of variation in the behavior of fathers and mothers toward sons and daughters, and even less about the possible effects of such differential treatment. All in all, it would seem that, before indulging in still further proliferation or even clarification of theory in this sphere, behavioral scientists would do well to follow the precedent of their colleagues in the natural sciences and to concentrate first on the more modest and at once more challenging task of discovering what phenomena do in fact exist that require theoretical explanation.

References

1. Bettelheim, B. Individual and mass behavior in extreme situations. *J. abnorm. soc. Psychol.*, 1943, 38, 417-452.
2. Bronfenbrenner, U. The study of identification through interpersonal perception. In R. Tagiuri & L. Petrullo (Eds.), *Person, perception and interpersonal behavior*. Stanford: Stanford Univer. Press, 1958. Pp. 110-130.
3. Courtney, P. D. Identification and learning: a theoretical analysis. Unpublished doctoral dissertation, Harvard Univer., 1949.
4. Freud, Anna. *The ego and the mechanisms of defense*. New York: International Universities Press, 1946.
5. Freud, S. The passing of the Oedipus-complex. In *Collected papers*. Vol. II. London: Hogarth, 1924. Pp. 269-282.
6. Freud, S. Mourning and melancholia. In *Collected papers*. Vol. IV. London: Hogarth, 1925. Pp. 152-170.
7. Freud, S. On narcissism; an introduction. In *Collected papers*. Vol. IV. London: Hogarth, 1925. Pp. 30-59.
8. Freud, S. *New introductory lectures in psychoanalysis*. New York: Norton, 1933.
9. Freud, S. *The problem of anxiety*. New York: Norton, 1936.
10. Freud, S. The interpretation of dreams. In *Basic writings of Sigmund Freud*. New York: Modern Library, 1938. Pp. 181-549.
11. Freud, S. *Group psychology and the analysis of the ego*. London: Hogarth, 1948.
12. Freud, S. *An outline of psychoanalysis*. New York: Norton, 1949.
13. Freud, S. Dostoyevski and parricide. In *Collected papers*. Vol. V. London: Hogarth, 1950. Pp. 222-242.

14. FREUD, S. Some psychological consequences of the anatomical distinction between the sexes. In *Collected papers.* Vol. V. London: Hogarth, 1950. Pp. 186-197.

15. HELPER, M. M. Learning theory and the self-concept. *J. abnorm. soc. Psychol.,* 1955, 51, 184-194.

16. LAIR, W .S. Psychoanalytic theory of identification. Unpublished doctoral dissertation, Harvard Univer., 1949.

17. MILLER, D. R., & SWANSON, G. E. *Inner conflict and defense.* New York: Holt, in press.

18. MILLER, N. E., & DOLLARD, J. *Social learning and imitation.* New Haven: Yale Univer. Press, 1941.

19. MOWRER, O. H. Identification: A link between learning theory and psychotherapy. In *Learning theory and personality dynamics.* New York: Ronald, 1950. Pp. 573-616.

20. MOWRER, O. H. Neurosis and psychotherapy as interpersonal process: a synopsis. In O. H. Mowrer (Ed.), *Psychotherapy: theory and research.* New York: Ronald, 1953. Pp. 69-94.

21. PARSONS, T. *The social system.* Glencoe, Ill.: Free Press, 1951.

22. PARSONS, T., & BALES, R. F. *Family, socialization and interaction process.* Glencoe, Ill.: Free Press, 1955.

23. PARSONS, T., BALES, R. F., & SHILS, E. A. *Working papers in the theory of action.* Glencoe, Ill.: Free Press, 1953.

24. PARSONS, T., & SHILS, E. A. (Eds.) *Toward a general theory of action.* Cambridge, Mass.: Harvard Univer. Press, 1951.

25. SANFORD, N. The dynamics of identification. *Psychol. Rev.,* 1955, 62, 106-117.

26. SARNOFF, I. Identification with the aggressor: some personality correlates of anti-semitism among Jews. *J. Pers.,* 1951, 20, 199-218.

27. SEARS, R. R. Identification as a form of behavior development. In D. B. Harris (Ed.), *The concept of development.* Minneapolis: Univer. of Minnesota Press, 1957. Pp. 149-161.

28. SEARS, R. R., MACCOBY, E., & LEVIN, H. *Patterns of child rearing.* Evanston: Row, Peterson, 1957.

29. STOKE, S. M. An inquiry into the concept of identification. In W. E. Martin & C. B. Stendler (Eds.), *Readings in child development.* New York: Harcourt, Brace, 1954. Pp. 227-239.

30. TERMAN, L. M., & MILES, C. C. *Sex and personality.* New York: McGraw-Hill, 1936.

INFLUENCE OF INTELLIGENCE ON ANXIETY AND PERCEPTION OF SELF AND OTHERS[1]

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The view that anxiety is associated with dissatisfaction with self and others is widely held, and it has found support in a number of studies (2, 3, 5, 7, 13, 17). However, in previous research only slight attention has been given to the characteristics of the *Ss* which were studied. Consequently, little is known about the effects which such characteristics have on anxiety relationships. Yet, it seems reasonable to believe that the development of anxiety and the occasions in which anxiety occurs are conditioned by and depend to some extent on the individual's personal characteristics and experiences.

As an underlying assumption of this research, it was reasoned that differences in relationships between anxiety and attitudes toward self and others would be explicable in terms of the theoretical formulations of Rogers, Sarason, and others (4, 9, 10, 12, 15). This rationale may be briefly summarized as follows: When an individual is unable to make responses which lead to success, frustration is produced and anxiety is aroused. In the beginning, this anxiety leads to self-dissatisfaction and increased goal-oriented reactions. The self tends to be perceived as responsible for the frustration, and there is increased awareness of needs, of the obstacles to the satisfaction of needs, and of instrumental ways of overcoming obstacles. But as frustrations continue and anxiety grows more intense, behavior becomes more and more centered on the reduction of anxiety through defense mechanisms. As a result, defense-oriented reactions increase and others are perceived as responsible for the frustrations.

The specific purpose of the study reported here was to investigate the effects of intelligence on relationships between anxiety and attitudes toward self and others. If bright *Ss* tend to be less frustrated and more successful,

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then they should also show less anxiety than mentally dull *Ss*, as the results of previous research have indicated (8, 11, 14, 16, 18). As a consequence, on the basis of the rationale, we should also expect relationships between anxiety and dissatisfaction with others to be higher for mentally dull *Ss* than for *Ss* with high intelligence.

Procedures

The 709 *Ss* used in the study were seventh graders selected from the population of the Human Talent Project which is being conducted in four Texas communities. A more detailed description of this project is found in a report by Duke and Hindsman (6).

As part of the talent project, a variety of ability, achievement, and personality instruments were administrated to these *Ss* by the project's testing team. In this study use was made of the California Test of Mental Maturity, scales developed in the Texas Cooperative Youth Studies (CYS), the Castaneda-McCandless Anxiety Scale, and the Brown-Holtzman Survey of Study Habits and Attitudes (SSHA).

From the CYS and SSHA inventories eight scales were selected. Four of these were used as measures of the way individuals perceive themselves (social inadequacy, lack of personal adjustment, family tension, and school inadequacy). The other four were selected as measures of the way individuals perceive others (criticism of youth, low teacher valuation, criticism of education, and negative orientation to society).

To facilitate machine computations, all raw scores were converted to stanines before correlation coefficients were computed for subsamples based on intelligence and sex. Stanine values used to assign *Ss* to the three levels of intelligence were: HI = 7–9, MI = 4–6, and LI = 1–3.

Results

From Table 1 it can be seen that anxious *Ss* expressed more dissatisfaction with themselves and others than less anxious *Ss*, although the relationships are higher for indices of self-dissatisfaction. In general, then, there is good agreement between these results and those of previous studies and some support for the sufficiency of the rationale.

However, the major proposition of the study, that relationships between anxiety and other-dissatisfaction would be higher for *Ss* with below average intelligence, is only partially supported by the data in Table 1. Results for criticism of youth and negative orientation to society are as predicted. But the relationship for criticism of education is not significantly different for high and low intelligence adolescents. In addition, the relationship for teacher valuation is opposite to predictions, being higher for high intelligence *Ss*. With respect to sex differences, it should be noted that relationships for girls followed predictions better than those for boys.

TABLE 1

CORRELATIONS BETWEEN ANXIETY AND SELF-DISSATISFACTION AND OTHER-DISSATISFACTION SCORES OF ADOLESCENTS CLASSIFIED BY LEVEL OF INTELLIGENCE AND SEX

	High Intelligence			Medium Intelligence			Low Intelligence			
Scales (*N*):	*Boys* (74)	*Girls* (86)	*Total* (160)	*Boys* (269)	*Girls* (205)	*Total* (474)	*Boys* (43)	*Girls* (32)	*Total* (75)	*Total* (709)
Self-dissatisfaction										
Social inadequacy (CYS)	58	65	62	55	62‡	58	77	62	70	60
Lack of personal adjustment (CYS).	56	41	47	46	44	45	48	53	50	46
School inadequacy (SSHA)	42	52‡	47*	25	29	27	31	19	23	32
Family tension (CYS)	34	22	27	35	34	35	28	55	39	35
Other-dissatisfaction										
Criticism of youth (CYS)	07†	17‡	12*	25	26	25	45	57	48	26
Low teacher valuation (SSHA) ..	35	46‡	40*	11	21‡	13	12	02	06	20
Criticism of education (CYS)	26	44	36	23	25	24	38	34	36	29
Negative orientation to society (CYS)	40‡	14‡	26*	38	34	37	54	51	53	37

NOTE.—All decimal points have been omitted.

* Differences between r_{HI} and r_{LI} (Totals) significant at .05 level.

† Differences between r_{HI} and r_{LI} (Boys) significant at .05 level.

‡ Differences between r_{HI} and r_{LI} (Girls) significant at .05 level.

‡ Differences between r_{BOYS} and r_{GIRLS} (Within intelligence levels) significant at .05 level.

In interpreting these findings, an issue of some importance concerns the degree of intercorrelation among the various indices of self- and other-dissatisfaction, and the relationship of these scales to intelligence. For the group as a whole, the intercorrelations among the indices of self and other dissatisfaction ranged from .13 to .74, with most highly correlated measures being school inadequacy, low teacher valuation, and criticism of education. These latter relationships are particularly significant in view of the large differences in Table 1 on two of these measures. In addition, the correlation between intelligence and anxiety was —.15, while the correlations between intelligence and the various measures of self- and other-dissatisfaction ranged from statistical insignificance to .28.

Noteworthy, also, is the general lack of mean differences between the subsamples on the various scales. In an analysis of variance of anxiety,

self, and other scores of a random sample of 144 of these *Ss*, the following results, pertinent to the present study, were obtained: (a) There were no significant interactions between intelligence and sex. (b) There were significant differences between levels of intelligence on anxiety and school inadequacy (SSHA), with HI *Ss* reporting less anxiety and fewer feelings of school inadequacy. (c) Boys differed significantly from girls on low teacher valuation (SSHA), with girls reporting more favorable opinions of teachers than boys.

In addition, factor analytic studies have been in progress using varimax procedures. In one such analysis the *Ss* of the present study were classified by levels of intellectual functioning. Findings pertinent to the present investigation may be briefly summarized as follows: For HI *Ss*, anxiety had significant loadings on two factors. The factor with the higher anxiety loading also had high loadings on social inadequacy, lack of personal adjustment, and family tensions. Loadings of the other tests used in this study were either low or insignificant. Low teacher valuation and school inadequacy had the highest loadings on the other anxiety-loaded factor. However, these loadings were opposite in sign to the anxiety loading. Other tests with significant loadings on this factor included criticism of education, negative social orientation, and social inadequacy. For LI *Ss*, anxiety loaded significantly on only one factor. Other tests loading on this factor included social inadequacy, lack of personal adjustment, family tensions, negative social orientations, criticism of youth, and criticism of education.

Discussion and Conclusions

The results of this study substantiate the generally accepted hypothesis that anxiety produces dissatisfaction with self and others, for it was found that anxious *Ss* expressed more self- and other-dissatisfaction than less anxious *Ss*. However, as predicted by the rationale of the study, these relationships were modified to some extent when the intelligence of the *Ss* was considered. Within the limits of this study, then, it can be concluded that relationships between anxiety and attitudes toward self and others have only limited generality, the nature of such relationships depending to some extent on the characteristics of the sample studied.

As results indicate, the rationale was less successful in predicting relationships for boys than it was for predictions for girls. A possible explanation of this, which is suggested by Sarason's findings, is that a high anxiety score does not have the same significance for boys as it does for girls (1, 17). Due to cultural pressures and training, boys may find it more difficult to admit anxiety during adolescence. In addition, boys may express anxiety differently than girls. This raises the issue of whether scores on the same self- and other-dissatisfaction measures have comparable meaning for boys and girls.

Particularly noteworthy, also, was the failure of the rationale to predict results for school-related attitudes. Clear-cut differences on these attitudes were obtained between high and low intelligence *Ss*, but differences were not in accord with predictions. In two of the three measures relationships were significantly higher for *Ss* with high intelligence. From the rationale there is the presumption that this means that bright *Ss* become more ego-involved in school activities, develop higher expectations and goals, and consequently suffer more frustration and anxiety in school situations than *Ss* with low intelligence. However, such an explanation is at variance with previous findings (12, 13, 16). A more definitive explanation must await further research.

References

1. Bendig, A. W. Age, sex, and the manifest anxiety test. *J. consult. Psychol.*, 1954, 18, 16.
2. Block, J., & Thomas, H. Is satisfaction with self a measure of adjustment? *J. abnorm. soc. Psychol.*, 1955, 51, 254-259.
3. Calvin, A. D., & Holtzman, W. H. Adjustment and the discrepancy between self concept and inferred self. *J. consult. Psychol.*, 1953, 17, 39-44.
4. Castaneda, A., Palermo, D. S., & McCandless, B. R. Complex learning and performance as a function of anxiety in children and task difficulty. *Child Develpm.*, 1956, 27, 327-332.
5. Doris, J., & Sarason, S. B. Test anxiety and blame assignment in a test situation. *J. abnorm. soc. Psychol.*, 1955, 50, 335-338.
6. Duke, R. L., & Hindsman, E. Educational utilization of human talent: note on research project. *Psychol. Rep.*, 1959, 5, 252.
7. Fey, W. F. Correlates of certain subjective attitudes toward the self and others. *J. clin. Psychol.*, 1957, 13, 44-49.
8. Grice, G. R. Discrimination reaction time as a function of anxiety and intelligence. *J. abnorm. soc. Psychol.*, 1955, 50, 71-74.
9. Hillson, J. S., & Worchel, P. Self concept and defensive behavior in the maladjusted. *J. consult. Psychol.*, 1957, 21, 83-88.
10. Jessor, R., & Hammond, K. Construct validity and the Taylor Anxiety Scale. *Psychol. Bull.*, 1957, 54, 161-170.
11. McCandless, B. R., & Castaneda, A. Anxiety in children, school achievement, and intelligence. *Child Develpm.*, 1956, 27, 379-382.
12. Mandler, G., & Sarason, S. B. A study of anxiety and learning. *J. abnorm. soc. Psychol.*, 1952, 47, 166-173.
13. Mandler, G., & Sarason, S. B. The effect of prior experience and subjective failure on the evocation of test anxiety. *J. Pers.*, 1953, 21, 336-341.

14. Phillips, B. N., McGuire, C., & King, F. J. Studies on anxiety: I. Anxiety and performance on psychometric tests varying in complexity. *Child Develpm.*, 1959, 30, 253-259.

15. Rogers, C. R. *Client-centered therapy*. Boston: Houghton-Mifflin, 1951.

16. Sarason, S. B. A test anxiety scale for children. *Child Develpm.*, 1958, 29, 105-113.

17. Sarason, S. B., *et al.* Rorschach behavior and performance of high anxious and low anxious children. *Child Develpm.*, 1958, 29, 277-285.

18. Zweibelson, I. Test anxiety and intelligence test performance. *J. consult. Psychol.*, 1956, 20, 479-481.

AN APPARATUS FOR INFANT CONDITIONING RESEARCH[1]

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Among the many problems facing the experimenter in conditioning research with infants are those related to controlled administration of the conditioned and unconditioned stimuli and objective recording of the conditioned and unconditioned response. This article is a description of the design and operation of a unit which is currently in use for neonatal defense and infant conditioning research. The apparatus (Figure 1) consists of the following components:

1. *Experimenter's Control Box.* This is a sample unit containing a relay and double pole, double throw push button switch. Depressing the push button operates a relay which, once activated, is locked into place through a circuit in Timer 3. It remains activated throughout the entire experimental interval or trial and its purpose is to start the recorder motor ahead of and during the conditioned stimulus-unconditioned stimulus se-

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Child Develpm., 1960, 31, 47-51.

quence (CS-UCS). Releasing the push button energizes Timer 1 and initiates the CS-UCS sequence.

2. *Three Hunter Decade-Type Electronic Interval Timers* (1). Although Figure 1 shows two interval timers, three were actually used and have been incorporated in the schematic circuit (Figure 2). With the onset of Timer 1 the buzzer (CS) and an event marker on the Brush oscillograph are energized. The buzzer is sounded during both Timer 1's and Timer 2's intervals. The event marker is de-energized at the end of Timer 1's interval.

At the finish of its interval, Timer 1 sets in operation Timer 2 which administers the UCS. One of the stimulator electrodes is connected in series with the normally opened contacts of Timer 2's start relay and with the normally closed contacts of Timer 2's finish relay to the stimulator. With one electrode so connected the shock is applied when Timer 2 starts its interval and is turned off at the end of the interval. The finish of Timer 2, corresponding to the termination of the CS-UCS interval, is indicated by pulsing the event marker and the activation of Timer 3.

The purpose of Timer 3 is to allow the recorder to remain operative in case the subject responds after the termination of the CS-UCS sequence.

3. *Rectifier Box.* This unit houses a multivoltage transformer and a full-wave bridge selenium rectifier with its 40-microfarad filter capacitor as well as interconnections for the other components to minimize the number of cables. The primary coil of the transformer is energized when the Experimenter's Control Box push button is released and the 6-volt alternating current output of the transformer operates the buzzer. The 18-volt alternating current output is rectified by the full-wave bridge selenium rectifier with its 40-microfarad filter capacitor and the voltage supplied to the linear motion potentiometer. The potentiometer output is used to drive the pen motor. For convenience voltage for the event marker was obtained from four flashlight batteries in series.

4. *Grass Model 3C Physiological Research Stimulator.* This stimulator is essentially a square-wave generator which offers maximum calibration relative to frequency, pulse duration, and pulse delay as well as voltage. The model used is not commercially available and has been replaced by the Grass Model S4SC which provides basically the same features relative to parameter calibration. The dial settings were constant for frequency, 10 cycles per second, and for pulse duration, .5 milliseconds. Only a monphasic type wave was used for stimulation with no pulse delay. These settings were empirically determined and established as producing the unconditioned response (UCR) consistently with minimal neonatal irritability and activity. Voltage calibration was individually established. As noted, the stimulator output is administered to the subject at the start of Timer 2's interval. The UCS delay was 1 second. This output is continued to the Boot Board where electrodes are attached to the subject.

5. *Boot Board.* This component is a construction of masonite which holds a Bourns Linear Motion Potentiometer, electrodes from the stimu-

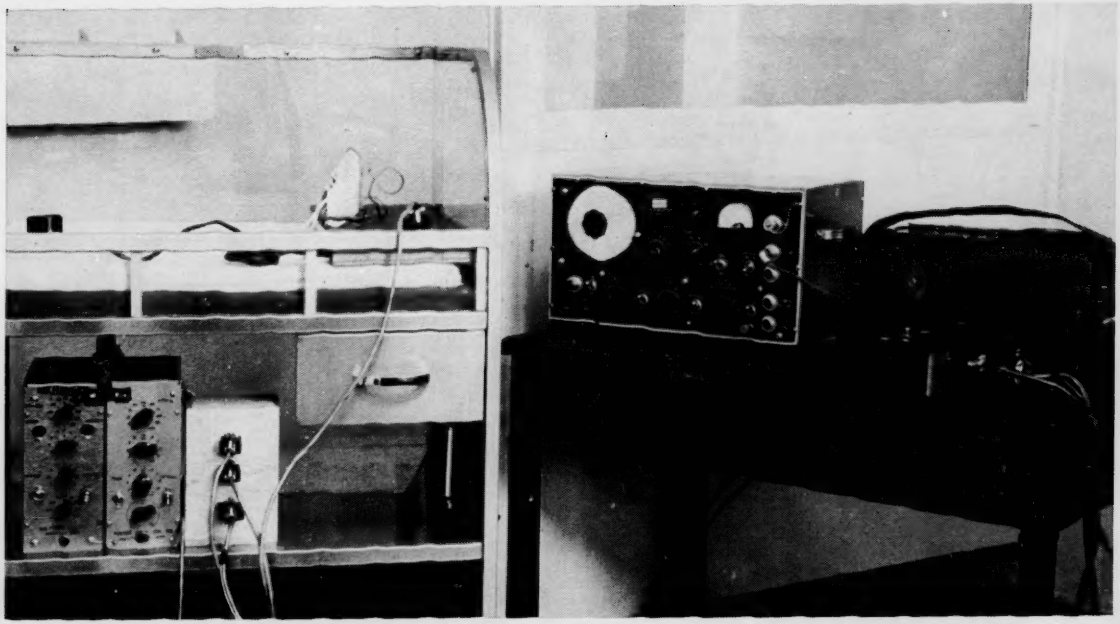

FIGURE 1—Photograph of assembled components in apparatus for infant conditioning.

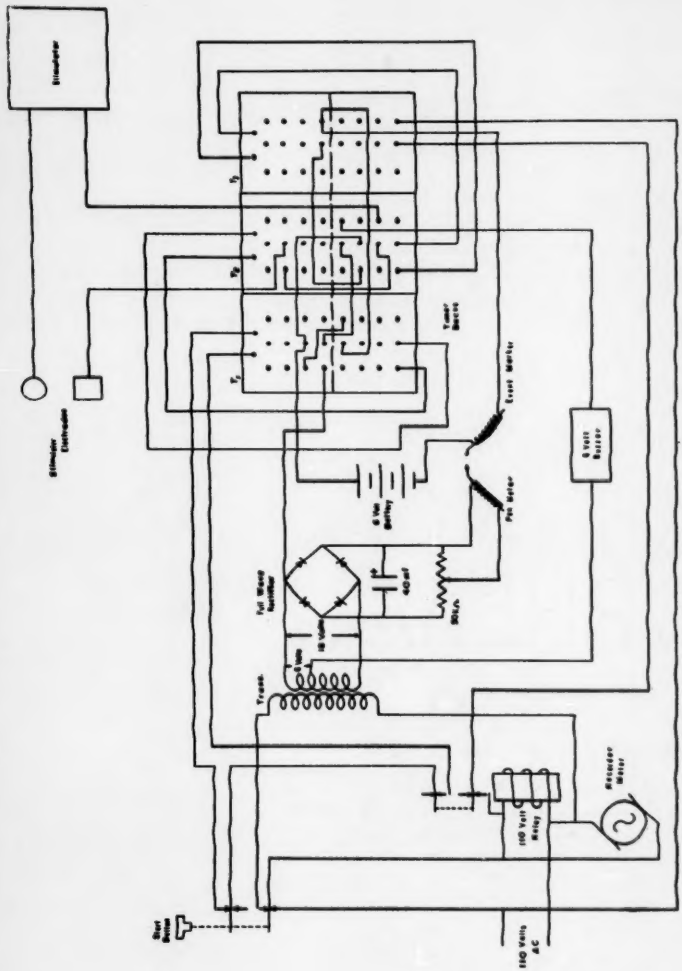

FIGURE 2—Schematic circuit of apparatus for infant defense conditioning.

lator, and a plug for the buzzer. The Boot Board is placed at the foot of the crib and the infant's foot in turn placed in the boot. The electrode to be affixed to the big toe of the subject is brought in through the toe of the boot. The boot in turn is connected to the movable arm of the potentiometer.

The CS was a Johnson Speed-X High Frequency Buzzer, Model 114-400, which provides a variable tone through a screw adjustment. This buzzer plugs into a receptacle in the Boot Board and voltage was supplied through cables from the rectifier box.

6. *Brush Model BL-200/401 Oscillograph.* The movable arm of the linear motion potentiometer provided voltage for the pen motor of the Brush Direct Writing Magnetic Oscillograph. This is a single channel recorder with one event marker using chart paper BL-923, 2⅜ inches wide, with 5-millimeter longitudinal divisions and 1-millimeter transverse divisions. Chart speed paper was operated at the rate of 5 millimeters per second. Figure 3 illustrates the type of recording for (a) the UCR and (b) an anticipatory CR.

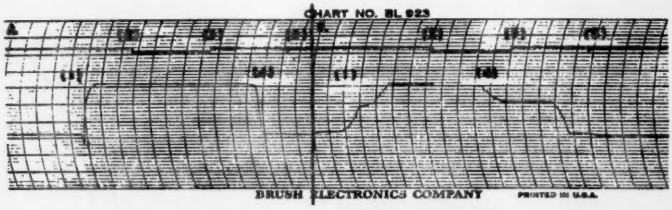

FIGURE 3—Illustrative record obtained in infant defense conditioning and demonstrating the objective correlation of variables.

Section A. Trial 12, female neonate approximately 4 days old. (1) Pen tracing following onset of the recorder. (2) Event marker depicting onset of the buzzer, CS. (3) Event marker showing onset of electric stimulator, UCS. (4) Movement of pen corresponding to leg withdrawal, UCR. (5) Pulsing of event marker at termination of the CS-UCS interval.

Section B. Trial 13, same female neonate. (1) Pen tracing following onset of recorder. Note wavering suggestive of foot movement and possibly conditioning to sound of motor. (2) Event marker depicting onset of the buzzer, CS. (3) Event marker showing onset of electric stimulator, UCS. (4) Anticipatory leg withdrawal, initially slight, but sufficiently large enough to warrant defining as an anticipatory CR. Further leg withdrawal follows onset of UCS. (5) Pulsing of event marker at end of CS-UCS interval.

As can be seen, conditioning takes place in a relatively large crib. With the infant supine, electrodes from the Boot Board are attached to the right big toe and the dorsal surface of the right leg. Currently only gauze and a .9 per cent saline solution have been utilized for the contact areas. The infant is adjusted so that the right leg is in a natural position when the

boot rests at the maximum extension of the potentiometer and the variable arm of the potentiometer slides back and forth easily when slight pressure is exerted on the infant's leg.

After being physically placed in the apparatus, the infant's threshold or responsiveness to shock is determined. A series of electrical shocks, the unconditioned stimulus (USC), of a frequency of 10 cycles per second and a pulse duration of .5 milliseconds are administered in 5-volt steps, beginning at 20 volts, until the subject makes two successive leg withdrawals. As a tentative criterion these leg movements which constitute the unconditioned response (UCR) must occur within 1 second after the onset of the UCS. In spite of the variability in absolute intensity, effective intensity is automatically equated for all subjects. The threshold voltage is the unconditioned stimulus intensity used to begin the conditioning series. In general, if an infant fails to respond within 1 second on a conditioning trial, the voltage is raised in 2.5 volt steps. (It has been observed, however, that the adaptation effect is best handled through a 5-volt step raise.)

Conditioning trials are initiated by simply depressing the push button on the Control Box; this starts the recorder motor before each CS-UCS sequence, and releasing the button results in the presentation of the CS-UCS. The operator of the Control Box must insure that the infant's foot is positioned before the beginning of each trial. If the baby does not move his foot back to position within a few seconds after each trial, the experimenter can do so by pushing it gently forward. It has been most expeditious to use two experimenters: one, to operate the Control Box and adjust the infant; the other, to monitor the Stimulator, record intertrial intervals and note behavior.

Advantages of this apparatus are obvious. First, there is a controlled administration of the conditioned and unconditioned stimuli. Second, there is an objective recording of the unconditioned and conditioned response, as well as an objective correlation of all information (Figure 3). Further improvement in the apparatus is possible through use of an isolation unit with the Stimulator for maximum safety and a universal type joint for attaching the boot to the movable arm of the potentiometer for greater flexibility in leg movements.

References

1. Hunter, T. A., & Brown, J. S. A decade-type electronic interval timer. *Amer. J. Psychol.*, 1949, 62, 570-575.

THE EFFECT OF PRETRAINING REINFORCEMENT SCHEDULES ON CHILDREN'S LEARNING

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In a recent study Stevenson and Pirojnikoff (3) found that the rate with which children learned to discriminate among three forms was significantly affected by 20 pretraining trials in which responses to each form received 0 per cent, 50 per cent, or 100 per cent reinforcement. The *S*s who received 100 per cent reinforcement for the choice of each form during pretraining later learned to discriminate among the forms with rapidity; *S*s who received 50 per cent random reinforcement or 0 per cent reinforcement during pretraining showed a much slower rate of learning.

The results were interpreted as giving support to the assumption that response tendencies developed on the basis of the different pretraining reinforcement schedules operated during the learning trials in such a manner as to interfere with or to facilitate the development of the correct response. It was noted, however, that pretraining appeared to affect the general behavior of the children. The *S*s in the 100 per cent group performed in a smooth and efficient fashion, while *S*s in the other groups appeared to be perturbed and frustrated. This would seem to indicate that the differences in the rate of learning among the groups may be attributable not only to the development of different response tendencies to the discriminative stimuli but also to the development of more general behavioral differences.

The question asked in the present experiment is whether *S*s will show differences in rate of learning when pretraining is given with stimuli different from those used in the discrimination task. It would be predicted that if *S*s develop general response tendencies during pretraining which carry over to the learning task, the rate of learning of *S*s receiving high

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[1] This study is adapted from the master's thesis of the first author (1) and was supported by a grant from the National Science Foundation (G-3280) to the second author.

frequencies of reinforcement during pretraining should be faster than that of *Ss* receiving low frequencies of reinforcement.

METHOD

Subjects

The *Ss* were 36 children attending nursery schools in Austin, Texas.[2] The *Ss* ranged in CA from 4.1 to 5 years, with a mean CA of 4.7 years.

Apparatus

Four tasks were used in the study: three experimental games (Card Game, Picture Game, and Nursery School Game) and a size discrimination problem. The apparatus for each game has been described in detail (4). The apparatus for the discrimination problem included (*a*) three ¼-in. Masonite squares painted black, with sides of 2 in., 2.5 in., and 3 in.; (*b*) a gray tray for presenting the stimuli; and (*c*) an opaque screen which prevented *S* from observing *E* arrange the stimuli. Centered along the midline of the tray were three holes ¾ in. deep, with a diameter of 1¾ in. A large supply of marbles, a 50-hole marble board, and prizes consisting of balloons, small plastic figures, etc., were also used.

Procedure

The *Ss* were presented with the three games, followed by the learning problem. The games were dissimilar to each other and to the learning task. Since the games did not involve learning, different percentages of reinforcement could be given regardless of the specific responses *Ss* made. Two conditions of reinforcement were employed during the games. Half of the *Ss* were reinforced on two of the 12 trials allowed on each game, and half were reinforced on 10 of the 12 trials. These reinforcement schedules provided frequencies of reinforcement which were different from each other, but which were not so extreme as to appear improbable frequencies. Following the games, *Ss* were presented with the discrimination problem in which the response to one of the three stimuli was consistently reinforced. The discrimination problem used has been found to be a difficult one for *Ss* of the age level sampled in this study (2). The *Ss* receiving two reinforcements on each pretraining game are referred to as Group 2, and the *Ss* receiving 10 reinforcements are referred to as Group 10.

The *S* was seated at a small table and was told, "We're going to play some games today, and if you play real well, you can win some nice prizes." The prizes were displayed and, before beginning the games, *S* was told to select the three prizes that he liked the best and wished to win. The *S* was given the marble board and was told that he had to fill the marble board

[2] The writers wish to express their appreciation to the directors of the following nursery schools in Austin, Texas, for their cooperation in making *Ss* available: University of Texas, Tarrytown Methodist, All Saints, and the Jeffrey School.

with marbles in order to win the prizes. The *S* was instructed that he would receive a marble for his marble board only when he made a correct response.

The three games were administered to *S*s in random order. The instructions and procedure for each game have been described (4). Essentially, the Card Game consisted of *S*'s selecting 12 cards from a prestacked deck of black and red cards. The appearance of a red card was reinforced, and the cards were arranged so that half of the *S*s drew two red cards and half drew 10. In the Picture Game, *S* was to match 12 cards of different colors with 12 pictures. The *E* arbitrarily reinforced either two or 10 of the responses. The Nursery School Game required *S* to divide a set of 12 pictures of children into two sets according to the nursery school to which each child "belonged." Again, *E* arbitrarily reinforced either two or 10 of *S*'s responses. The responses which were reinforced followed a prearranged sequence which provided each *S* within each group with a different pattern of reinforcement for each of the three games.

After completing the games and without disturbing the continuity of the procedure, *S* was presented the learning task, which was introduced as a fourth game. The *S* was informed that this was the last game and that this was his last chance to get enough marbles to fill his board. By this time *S*s in Group 2 had received six marbles and *S*s in Group 10 had received 30 marbles.

The apparatus for the discrimination problem was placed before *S*, and *E* arranged the blocks behind the screen. The screen was rotated, revealing the blocks, and *S* was told, "The name of this game is Find-the-Marble. I've hidden a marble under one of these blocks and you have to find it. You choose the block under which you think the marble is hidden." The block under which the marble was hidden was varied at random among *S*s, and for a single *S* the marble was hidden only under this block throughout the experimental trials. During these trials the horizontal arrangement of the blocks on the tray was varied at random. A noncorrectional procedure was employed. The criterion for learning was five successive correct responses, and training was discontinued after 40 trials if this criterion was not met.

Results

The main results of the experiment are presented in Figure 1, which shows the mean number of correct responses made by *S*s in each group in successive blocks of 10 trials. Following the initial 10 trials, the groups differed consistently. Thirteen *S*s in Group 10 and four *S*s in Group 2 reached the criterion of five successive correct responses within 40 trials. The difference is significant at the .01 level ($\chi^2 = 7.22$, $df = 1$). The mean number of correct responses for the former group was 26.5 and for the latter, 17.5.

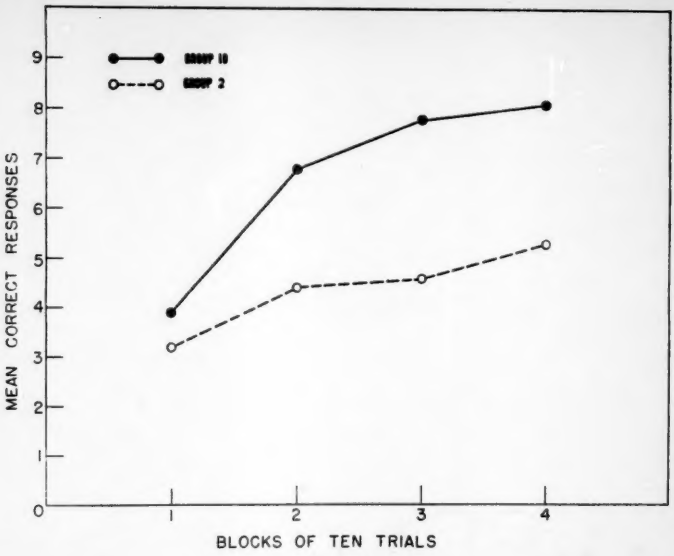

FIGURE 1—Mean number of correct responses in blocks of 10 trials for each experimental group.

An analysis of variance of the performance of the *Ss* on the learning task was performed (*see* Table 1). A highly significant difference was found in the incidence of correct response as a function of the frequency of reinforcement received during the pretraining games. The significant *F* associated with relative size of the correct stimulus is derived from the fact that *Ss* had more difficulty in discriminating the stimulus of intermediate size than either the largest or smallest stimuli. The significant *F* related to trials indicates that *Ss* showed a significant improvement in performance during the 40 trials. None of the interaction terms was significant at the .05 level.

In testing *Ss* a striking difference in the incidence of perseverative behavior was observed. The data were examined, therefore, to determine the incidence of such behavior in each group of *Ss*. Perseverative behavior was judged to occur when *S* made four successive repetitions of a particular incorrect response, based upon either size of the stimulus or position. In Group 2, 12 *Ss* and in Group 10, two *Ss* were judged to have demonstrated perseverative behavior. The difference is significant at the .01 level ($\chi^2 = 10.77$, $df = 1$). Perseverative responses to position occurred more frequently than perseverative responses to size.

TABLE 1

SUMMARY OF ANALYSIS OF VARIANCE

Source	*df*	*MS*	*F*
Between Ss			
Pretraining Condition (P)	1	186.8	42.4**
Relative Size of Correct Stimulus (S)	2	75.1	17.0**
P × S	2	13.5	3.1
Error (b)	30	4.6	
Within Ss			
Trials (T)	3	68.1	8.8*
T × P	3	10.0	1.3
T × S	6	4.3	0.6
T × P × S	6	1.3	0.2
Error (w)	90	7.7	

* $p < .01$
** $p < .001$

DISCUSSION

The results indicate that when the stimuli and responses involved in pretraining and learning tasks differ, faster learning is found following pretraining with high compared to low frequencies of reinforcement. It was assumed that different frequencies of reinforcement result in differences in general response tendencies which may aid or interfere with learning ability.

Observation indicated that the behavior of *Ss* receiving high frequencies of reinforcement did differ from that of *Ss* receiving low frequencies of reinforcement. The *Ss* in the former group appeared to take the games in stride and to enjoy playing them. The *Ss* in the latter group tended to show two general types of reactions. Some *Ss* became extremely eager and anxious. They kept looking over at the prizes, showing great delight at receiving a marble, etc. Other *Ss* became demoralized and withdrew from the situation in a defensive manner. They occasionally spoke about things that were irrelevant to the task and became aggressive toward the apparatus or accusative toward *E*.

It is not difficult to see how the behavior of the low reinforcement group might interfere with efficient learning. The extreme eagerness and anxiety as well as the high incidence of perseverative responses may be interpreted as indicating that some *Ss* were performing under conditions of high drive. There is ample evidence that high drive significantly decreases learning speed in complex tasks (5). Further, if *S* withdraws from the situation, learning ability would be impaired, for the irrelevant responses

made in withdrawal would interfere with the development of the appropriate responses.

It should be mentioned that the effects of pretraining found in the present experiment may not necessarily be found with less complex tasks. In a second experiment conducted by the authors, no significant differences were found as a function of pretraining reinforcement schedules when a simple runway problem was substituted for the discrimination problem. Two groups of 15 *Ss* with a mean CA of 4.5 years were given pretraining identical with that used in the present experiment and were then trained on a 6-ft. runway in which the approach to the goal was reinforced. Neither mean latency of response nor mean running time differed between groups who had received high and low frequencies of reinforcement during pretraining.

Summary

Two groups of 18 *Ss* each were given pretraining with three games which differed from each other and from a subsequent learning task. Group 2 was reinforced arbitrarily on two of the 12 responses made on each game, and Group 10 was reinforced on 10 of the responses. Following pretraining, *Ss* were presented with a size discrimination in which the response to one of three stimuli was consistently reinforced. In Group 2 fewer *Ss* learned the discrimination, and average number of correct responses was significantly lower than in Group 10. The results, therefore, indicate that pretraining gave rise to general response tendencies which persisted during the learning task in such a manner as to differentiate the rate of learning of the groups given high and low frequencies of pretraining reinforcement.

References

1. Steigman, M. J. The effects of success and failure upon discrimination learning in young children. Unpublished master's thesis, Univer. of Texas, 1958.
2. Stevenson, H. W., & McBee, G. The learning of object and pattern discriminations by children. *J. comp. physiol. Psychol.*, 1958, 51, 752-754.
3. Stevenson, H. W., & Pirojnikoff, L. A. Discrimination learning as a function of pretraining reinforcement schedules. *J. exp. Psychol.*, 1958, 56, 41-44.
4. Stevenson, H. W., & Zigler, E. F. Probability learning in children. *J. exp. Psychol.*, 1958, 56, 185-192.
5. Taylor, J. A. Drive theory and manifest anxiety. *Psychol. Bull.*, 1956, 53, 303-318.

CHILDREN'S CAUSAL REASONING ABOUT NATURAL PHENOMENA

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From interview data with children Piaget (6, 7, 8) has concluded that there are presumably universal developmental stages in the progression of an individual toward a final cognitive stage of seeing all physical relationships as being due to physical laws. He has postulated 17 levels of physical causality from the least to the most mature. Social activity, reasoning ability, and the child's "view of the world," all closely related to chronological age, are related to and affect the child's development through these stages. Attempts to teach the child either verbally or through experience to reason causally before 7 to 8 years of age is impossible.

Several investigators (e.g., 1, 2, 3, 4) have reported causal explanations given by children younger than 7. Difficulty level and familiarity of the child with the phenomenon are thought to affect the level of his reasoning; with easy and familiar phenomena, he can reason causally. Nass (5), in an ingenious experiment, has supported this point of view, and Isaacs (3) has argued for it.

It is evident in assessing these studies that very different approaches have been used to investigate Piaget's postulations. Different interpretations of his concepts seem also to have been made. The present writer presents her interpretation of Piaget's concept of physical causality and utilizes it in her investigation in this area. Piaget's use of the term includes the conventional popular notion of a relationship between cause and effect in the physical world. He was concerned with the child's ability to abstract general

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[1] This research was conducted while the author was an assistant teacher on the staff of the Iowa Child Welfare Research Station.

Child Develpm., 1960, 31, 59-65.

laws from repeated observations of physical events (induction), as well as the explanation of the events in terms of the laws (deduction). The child is able to reason causally, according to Piaget, when, for example, "from the laws which he has observed in connection with the floating of boats, the rise in the water level, the child draws explanations which imply concepts, such as density, specific weight, and so on" (8, p. 266). The present study investigates this two-fold view of physical causality at three age levels and involves three different physical themes.

Subjects and Method

The subjects (*Ss*) of the study were 60 children, 32 boys and 28 girls, aged from 5 years, 4 months, through 12 years, 0 months. All were enrolled in a public school in Iowa City, Iowa.[2] Members of three classes were employed: kindergarten, second, and fourth grades. The *IQ* for each subject was determined by the California Test of Mental Maturity (S-F). Within each class 10 pairs of children were matched as closely as possible for CA, IQ, and sex. By chance assignment one of each pair of *Ss* at each grade level was placed in an experimental or control group, such that for each class there were 10 in an experimental group and 10 in a control group. This resulted in six subgroups with a total *N* of 60.

Each *S* was alone with the Experimenter (*E*) during the entire two-phase experimental session. The first, or experience, phase took place during three six-minute periods and consisted of manipulation of objects by both *E* and *S*. The experiences for all the experimental groups consisted of the manipulation of objects *relevant* to the questions to be asked, whereas the control groups' experiences involved manipulating objects *irrelevant* to the questions. The experiences for the experimental groups were designed to afford each *S* the opportunity to formulate answers to the questions on the basis of his manipulation of certain objects. No verbal explanation accompanied any experience phase.

For the experimental groups, in order to facilitate their understanding of the water level principle (i.e., that the level of the water is raised at the insertion of an object because the object pushes aside the water), the following experiences were presented:

1. Three pieces of clay of the same shape but of three different sizes (small, medium, large) were placed individually in a jar of water. *S* was requested to note size differences of these objects and further to note how each piece of clay raised the level of the water by a different amount.
2. The same procedure was used for three pieces of wood of the same shape but of three different sizes.

[2] Grateful acknowledgment is extended to Superintendent Buford Garner, School Psychologist Sylvella Jacobsen, and principal, teachers, and cooperating children of Henry Sabin School for their help in carrying out this study.

3. A small pebble and a large piece of wood, which was lighter than the pebble, were inserted one at a time in the water. It was pointed out that placement of these objects in the water raised the water by different amounts.

4. A piece of clay and a piece of wood of the same size and shape were placed separately into the water. The piece of wood was pushed by *E* all the way under the water so that it could be seen that the water level rose to the same place it did when the clay was submerged under the water by its own weight.

5. *S's* hand and *E*'s hand were inserted in the water. The differences in the size of the hands as well as the different heights to which the level of the water was raised by each hand was pointed out to *S*.

To elicit the explanation that objects float because they are big and sink because they are little (this distortion of floatation will be discussed in a later section), five pairs of objects, one of each pair very much larger than the other, were placed in a dishpan of water. The differences and similarities between each object in a pair were compared, as were their different performances in the water.

The last set of experiences provided for the experimental groups was designed to aid in answering questions concerning the shadow principle. In a darkened room an unlighted candle was placed on a large piece of paper while a flashlight was moved around it. The movement of the shadow was noted as well as the relationship of the shadow to the light and to the candle. Secondly, *S* was asked to point the flashlight to a spot on the door. *E* moved a piece of paper in front of the light and then behind it. At the same time the appearance and disappearance of the paper's shadow was noted as well as its position to the light. Lastly, the overhead light was turned on and *S* was asked to walk around the room and to notice his shadow and its relation to himself and the overhead light. He was also asked to turn around in one place and to observe his shadow in relation to himself and the light.

The control groups' experiences were designed to interest the *Ss* and to give them the same general type of manipulative experiences with objects that the experimental groups had. One such set of experiences consisted in changing the color of water with food coloring. Another was to observe design differences in a kaleidoscope. Magnets were used in the third experience in which *S* picked up various objects with the magnets both out of water and then from under the water.

The questioning phase, which immediately followed each six-minute period of experience, was a type of interview in which all *Ss* were asked the same five predetermined questions concerning three physical principles: water level, floating, and shadows. A total of 15 questions was asked each *S* with accompanying clarifying ones when these were necessary in order better to understand *S*'s explanation. For the water level principle five objects were placed individually in a jar of water and *S* was asked to explain the resultant rise in water level for each one. The five questions pertaining to floatation were asked as five objects, some very large and

some very small, were put one at a time in a dishpan of water. Each *S* was questioned as to why one sank and others floated. The following five questions were asked concerning the shadow principle as each *S* held in front of him a black and white photograph of an ice-skating scene on a sunny day:

1. Why do you think there are shadows in this picture?
2. Why do you think the shadows are on one side of all these people and things and not on the other sides?
3. Do you think the shadow is always on the same side of people and things?
4. Why do you think the shadows are black?
5. Do you think there are shadows in the night?

The responses were rated by three judges, one of whom was *E*. A seven-point scale was used to assign ratings to each of the 15 responses for every *S*. This seven-point scale was constructed by *E*, with the assistance of a graduate student in physics, according to the adequacy of the explanation and using scientific correctness as a criterion. A rating of 7 involved a correct and complete answer; rating 6 was assigned to a correct but incomplete answer; to a fair explanation, which included some sense of the principles involved, a rating of 5 was given; a poor but vague reference to the correct principle was assigned a 4 rating; 3 was given to an incorrect explanation; the rating of 2 and 1 were assigned, respectively, to a simple repetition of the phenomenon and to a nonmaterialistic response (e.g., purposeful, religious, etc.). This scale was constructed because it was found impractical to rate the responses according to Piaget's 17 levels of causal explanation, since each level did not apply to all phenomena. It was determined beforehand that a response of "I don't know" would be assigned no value because judgment could not be made as to whether this type of answer cloaked shyness or one degree or another of incomprehension. *E* gently "pushed" each *S* who gave an "I don't know" response to attempt some sort of answer. There were 45 of the "I don't know" type response, only 5 per cent of a total of 900 responses.

E and the other judges, graduate assistants in Child Welfare, conferred before rating the responses so as to become familiar with the scale. The protocols of 30 of the 60 *S*s were randomly divided into three subgroups. Each subgroup was rated by a different pair of judges. The materials were arranged so as to prevent identification by the judge either of the *S*'s age, group, or other judges' rating. This design permitted separate evaluation of the agreement between each of the three pairs of judges. The percentages of agreement for the three pairs were: 60, 66, and 75 per cent. Analysis by means of product-moment correlations yielded reliabilities of .67, .72, and .88. Further clarification of the characteristics defining each of the seven levels was made before the remaining protocols were rated by the same judges. The procedure for assigning the protocols to each of the three

pairs of judges was the same as that described above. For this second group of protocols, the percentages of agreement were: 89, 76, and 85 per cent. Product-moment correlations were .97, .87, and .93. These *r*'s may be somewhat inflated by the presence in the to-be-judged protocols of more than one answer per child, although inspection of the protocols gives no reason to consider this an important factor, as answers were short and personally nonrevealing.

It was decided beforehand that only *E*'s ratings would be employed in the statistical analysis of the data. The ratings of the other judges, compared with each other and *E*, were used to evaluate *E*'s reliability in rating the protocols.

A mean score for the answers to the five questions for each principle was computed for every *S*. These scores were used to arrive at a total mean score for each of the six subgroups for every principle. The group mean scores were employed in the statistical analysis of the results.

Results

Analysis of the data by chi square technique using Yates' correction for one degree of freedom revealed significant age differences in levels of explanation. The distribution of the mean scores for all *S*s over all principles was divided at the median and a 2×3 chi square test of independence revealed an over-all age difference beyond the .001 level of confidence. The same procedure was employed to compare the differences between each pair of age levels. These analyses revealed that level of performance increased significantly with age; i.e., the older *S*s had a higher level of performance. The kindergarten group was significantly lower than both the second and fourth grade groups at less than the .001 level of confidence. The difference between the second and fourth grades was significant at less than the .05 level of confidence. The second grade was significantly lower than the fourth grade.

To test for differences in the level of difficulty among the three principles, separate chi square comparisons for each pair of principles were made, disregarding the age and treatment conditions. These analyses showed that the floating principle was significantly less difficult than the water level principle ($p < .05$). There were not significant differences between the floating and shadow principles, or between the water level and floating principles.

The difference between the level of explanation of the experimental and control groups was tested at each age level and for each principle separately. None of these nine chi squares approached significance.

Evidence for the positive influence of experience on the child's level of explanation before the age of 7 or 8 was observed in relation to the floating principle. In the youngest group (5-to-6-year-olds) six *S*s explained the phenomenon observed at the highest level of reasoning.

Discussion and Summary

The importance of age as a correlate of the adequacy of the child's explanation of certain physical phenomena has been shown in the present study. This finding lends support to Piaget's view of the relationship of CA to the child's level of causality. Additionally, these findings may be attributed in part to several developmental factors: First, verbal skills are more highly developed in older children, thus probably allowing for more adequate explanations by means of a more highly developed symbol system. In addition, the older *S*s have probably had more formal and informal learning experiences with physical phenomena in general. A third factor concerns social presence; that is, as a group, the oldest *S*s seemed less shy with the strange adult (*E*) and therefore may have been less restricted in answering the questions.

Although the present findings show the age variable to be the only statistically significant factor in the design, attention should be given to the treatment effect. The mean scores for all except one of the experimental subgroups (at three age levels) were higher than the mean scores of the control subgroups (at three age levels). The manner in which the "I don't know" responses were handled in scoring may have served to conceal sizeable differences between the experimental and control groups. The number of "I don't know" responses was seven in the experimental groups, but totalled 38 in the control groups. Had these responses been rated zero, the mean level of explanation for the experimental groups would have been substantially higher than for the control groups.

A conscious attempt was made in designing the study to present one principle which was judged by the investigator to be very easy for all *S*s. This was the floating principle, which was presented so that children were given an opportunity to induce an explanation on the basis of size of object (small ones sink, large ones float). As was noted earlier, Piaget states that the level of causal thinking is developmentally determined to the degree that attempts at teaching before the age of 7 or 8, either through experience or explanation, will not affect an individual's level of explanation of physical events. The present investigation offers some evidence contrary to Piaget's contention. At the youngest age level (5 to 6) *four* children in the experimental group offered explanations for the floating principle that involved the size of the objects. In the control group of the same age level *two* children utilized size as the cause of an object floating or sinking. Both the experimental and control groups had some experience with the phenomenon in question. The experimental group had a period of learning experiences with the floating principle in both the experimental phase and in the questioning phase. The control group was exposed to learning experiences with the phenomenon only during the questioning phase of the session. It should be noted that there were 14 such responses among the four *S*s in the experimental group, whereas there were only two such

responses for the two *Ss* in the control group. Several children in the older groups also explained the floating events in terms of the size of the objects. The above finding is most important in that it offers positive evidence that children at these various ages (including those younger than 7 years) can induce laws from repeated observations of a phenomenon and can explain the event in terms of these laws.

References

1. Deutsche, J. M. *Children's concepts of causal relations.* Minneapolis: Univer. of Minnesota Press, 1937.
2. Grigsby, O. J. An experimental study of the concepts of relationships in preschool children as evidenced by their expressive ability. *J. exp. Educ.,* 1932, 1, 144-162.
3. Isaacs, S. *Intellectual growth in young children.* London: Routledge & Kegan Paul, 1950.
4. McAndrew, B. Experimental investigation of young children's ideas of causality. *Catholic Univer. of Amer. Stud. in Psychol. and Psychiat.,* 1943-1947, Serial 12, No. 6.
5. Nass, M. L. The effects of three variables in children's concepts of physical causality. *J. abnorm. soc. Psychol.,* 1956, 53, 191-196.
6. Piaget, J. *Judgment and reasoning in the child.* London: Paul, Trench, Trubner, 1928.
7. Piaget, J. *The child's conception of the world.* New York: Harcourt, Brace, 1929.
8. Piaget, J. *The child's conception of physical causality.* New York: Harcourt, Brace, 1930.

VALIDITY OF THE CHILDREN'S MANIFEST ANXIETY SCALE AND THE MODIFIED REVISED CALIFORNIA INVENTORY [1]

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The children's form of the Manifest Anxiety Scale (CMAS) was adapted from the widely-used Taylor Manifest Anxiety Scale (MAS) by Castaneda, McCandless, and Palermo (2). The purpose of the adaptation was to extend the generality and continued usefulness of the MAS over a wider range of different populations.

The Revised California Inventory (RCI) was developed by Else Frenkel-Brunswik for use with youngsters of junior high school age and purports to measure the author's concept of rigidity, i.e., the intolerance of ambiguity. Fleming (3) changed the wording of the inventory in order to present the scale to fourth, fifth, and sixth graders. Fleming's adaptation is called the Modified Revised California Inventory (MRCI).

The purpose of this paper is to study the validity of the CMAS and the MRCI through the application of the tests to behavior problem children (high anxiety and rigidity) and to regular class children (normative group).

An overabundance of anxiety in behavior problem children has been aptly described by Redl and Wineman (8), and Lindgren (7) says,

> Children who misbehave or are delinquent are more likely motivated by an excess of anxiety rather than by its absence, although their behavior frequently resembles that of the child who lacks sufficient anxiety. Usually they are students who are, psychologically speaking, more vulnerable, who are more troubled by anxiety than others, and who are more inclined to interpret the everyday events of life as disapproval or rejection. As a result, these individuals are plagued with a superabundance of neurotic anxiety (p. 74).

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[1] The research was made possible through the valuable assistance of Miss Margaret Holland, supervisor of elementary guidance, and the teachers of the adjustment classes in the San Francisco Unified School District.

Observations and discussions with teachers corroborate high anxiety and rigidity in adjustment class children. Fleming (3) indicates that loss of flexibility is often an accompaniment to high anxiety, and Frenkel-Brunswik says, "There is ample evidence from various kinds of clinical materials that the clinging to external stimuli (rigidity) is often a sign of anxiety" (3, p. 136).

It appears logical to assume that behavior problem children have more anxiety and are more rigid than regular class children. Therefore, behavior problem children can serve as a criterion group for testing the validity of the CMAS and the MRCI.

Behavior problem children in this study were defined as those in adjustment classes. Adjustment classes in the San Francisco schools have been created to help children who, because of difficulties in emotional and social adjustment, have special need for instruction. They are designed especially for children with normal intellectual potential, and the common underlining symptom is the inability to profit from regular classroom instruction.

All fourth, fifth, and sixth grade adjustment class boys were given the CMAS and the MRCI. A matching grade sample of regular class boys was given the same battery. The regular class sample was chosen from the same school areas as the adjustment class boys in order to control socioeconomic status. This sampling procedure proved successful in that, according to a one-way analysis of variance, there was no significant difference between the groups in socioeconomic status.

Analysis of variance and the t test were used to test level of significance of group differences and significance of differences between groups. Correlations were used to analyze the relationships between the variables. Partial correlations were computed between anxiety, rigidity, and socioeconomic status, as measured by paternal occupation.

Mean scores and standard deviations on the CMAS and the MRCI are reported in Table 1.

TABLE 1

MEANS AND STANDARD DEVIATIONS OF SCORES OF ADJUSTMENT CLASS AND REGULAR CLASS BOYS ON ANXIETY, L, AND RIGIDITY SCALES

	Adjustment Class $N = 124$		Regular Class $N = 153$	
Scale	*M*	*SD*	*M*	*SD*
Anxiety	23.1	8.2	20.5	8.0
L	4.5	2.3	4.5	2.3
Rigidity	33.6	7.4	31.6	7.5

The reliability of the anxiety scale using the Kuder-Richardson formula was .86, which is similar to the reliabilities reported for the CMAS (2) and for the MAS (10). A t of 3.3 between mean scores of the groups on the CMAS is significant at the .01 level and confirms the hypothesis of higher anxiety scores for behavior problem children. Means and standard deviations were identical on the L scale of the CMAS.

The reliability of the rigidity scale using the Kuder-Richardson formula was .75, comparable to the findings of Fleming (3). A t of 3.2, significant at the .01 level, was obtained between mean scores of the groups on the MRCI and supports the prediction of higher rigidity in behavior problem children.

Despite the significant differences between adjustment class and regular class boys on the anxiety and rigidity scales, the absolute differences between the two groups were small and the standard deviations were similar.

The correlations between the variables are reported in Table 2.

TABLE 2

CORRELATIONS BETWEEN ANXIETY, RIGIDITY, AND L SCALES, SOCIOECONOMIC STATUS, AND INTELLIGENCE

	N*	r
Anxiety and rigidity scales	273	.25‡
Anxiety and the L scales	277	—.14†
Rigidity and the L scales	271	.26‡
Anxiety and SES	245	.29‡
Rigidity and SES	240	—.27‡
Anxiety and intelligence	236	—.05
Rigidity and intelligence	234	.03

* The Ns fluctuate since information on each of the variables was not available in all cases.
† Significant at .05 level.
‡ Significant at .01 level.

The significant relationship between the CMAS and the MRCI shows a tendency for individuals who score high on the anxiety scale to score high on the rigidity scale. The correlation of —.14 between the anxiety scale and the L scale is comparable to that reported by Levitt (6) for Chicago children on the same measures. In contrast, Castaneda, McCandless, and Palermo (2) report nonsignificant correlations ranging from .03 to —.10 for boys in the fifth and sixth grades. The statistically significant correlations between scores on the L scale and the rigidity scale indicates that children who score high on the L scale also tend to score high on the MRCI.

Socioeconomic status is positively related to the CMAS but negatively related to the MRCI. Fleming (3) also found a negative relationship be-

tween socioeconomic status and rigidity scores. She explains the finding by reference to Frenkel-Brunswik's hypothesis that the seeking of new values is characteristic of lower socioeconomic individuals and that, in order to have something concrete to hang on to, these lower status persons resort to rigid, black-and-white characterizations which manifest themselves in rigid attitudes.

Results of a simple one-way analysis of variance indicate a significant difference between groups in intelligence test scores ($F = 6.3$, $p = .01$), with adjustment class children having the lower scores. The results confirm the data of Bower (1), who reported a significant difference between adjustment and regular class children in IQ. It might be supposed that it is the inferior intelligence of the child in the adjustment class that explains his greater anxiety, particularly when confronted with the academic demands of the classroom situation. However, as may be seen in Table 2, the correlation between intelligence and anxiety is nonsignificant. Nor was there any significant relationship between rigidity and intelligence as measured in this study.

In view of the relationship between anxiety, rigidity, and socioeconomic status (SES), partial correlations were computed with the following results: anxiety and rigidity, SES constant, $r = .34$; anxiety and SES, rigidity constant, $r = .38$; rigidity and SES, anxiety constant, $r = -.36$.

Discussion

Use of adjustment class children as a criterion group for testing the validity of the CMAS and the MRCI served to demonstrate that both instruments differentiated adjustment class and regular class children. What the instruments were measuring is more difficult to ascertain. Three general points of view concerning the anxiety scale can be identified. The first, represented by Spence, Taylor, and Ketchel (9), claims that the anxiety scale reflects, in part, the general drive level. Castaneda, McCandless, and Palermo (2), in a study using the CMAS, found that high anxious children tend to be inferior in more difficult tasks but superior on less difficult tasks. The findings of the present study are consistent with this point of view; that is, the performance of adjustment class children is inferior on complex tasks of learning and behavior because of the high anxiety which impairs their performance.

But Jessor and Hammond (5) see the anxiety scale as measuring different habit responses rather than different drive levels. They are concerned with the lack of item validity of the MAS in relation to the Hullian theory of drive.

A third hypothesis is that a relationship exists between anxiety and neuroticism. There is some supporting evidence for this claim. The original items of the MAS were drawn from the MMPI, and the scale is correlated with other measures of neuroticism. For example, Holtzman, Calvin, and

Bitterman (4) reported a corrected correlation of .86 with the Winnie scale of neuroticism. Tong (11) found high correlations between the MAS and the Maudesley Medican Questionnaire which is loaded with the neuroticism factor. The findings of the present study also lend some support to this point of view. The children in the adjustment class are not "normal" in the sense that they are unable to conform to the average classroom situation. They appear to have inadequate ego controls; aspects of their overt behavior are similar to those exhibited by the disturbed children described by Redl and Wineman (8). It is probable that any measure of neurotic attitudes would result in similar findings.

Summary

The Children's Manifest Anxiety Scale and the Modified Revised California Inventory were administered to adjustment and regular class boys in the fourth, fifth, and sixth grades.

The reliability of the anxiety scale was .86; that of the rigidity scale, .75. There were no significant mean differences between adjustment class and regular class children on the L scale or in socioeconomic status. Differences between mean scores of adjustment class and regular class boys were found to be significant at the .01 level on anxiety, rigidity, and intelligence. The correlation between the anxiety and rigidity scores was .25, significant at the .01 level. Higher correlations were obtained between anxiety, rigidity, and socioeconomic status when each variable was held constant through partial correlation.

It was concluded that the finding of significant differences between adjustment and regular class boys on the Children's Manifest Anxiety Scale and the Modified Revised California Inventory provides evidence of their validity.

References

1. Bower, E. M. Early identification of emotionally disturbed children. California State Dept. of Education, Sacramento, August, 1958.
2. Castaneda, A., McCandless, B., & Palermo, D. The children's form of the manifest anxiety scale. *Child Develpm.*, 1956, 27, 317-323.
3. Fleming, Elyse S. Behavioral and attitudinal rigidity as related to socioeconomic status and other factors. Unpublished doctoral dissertation, Univer. of California, Berkeley, 1956.
4. Holtzman, W. H., Calvin, A. D., & Bitterman, M. E. New evidence for the validity of Taylor's manifest anxiety scale. *J. abnorm. soc. Psychol.*, 1952, 47, 853-854.
5. Jessor, R., & Hammond, K. Construct validity and the Taylor anxiety scale. *Psychol. Bull.*, 1957, 54, 161-169.

6. LEVITT, E. E. Ecological differences in performance on the children's manifest anxiety scale. *Psychol. Rep.*, 1957, 3, 281-286.

7. LINDGREN, H. C. *Mental health in education.* New York: Holt, 1954.

8. REDL, F., & WINEMAN, D. *Children who hate.* Glencoe, Ill.: Free Press, 1951.

9. SPENCE, K. W., TAYLOR, JANET A., & KETCHEL, R. Anxiety (drive) level and degree of competition in paired-associates learning. *J. exp. Psychol.*, 1956, 52, 306-310.

10. TAYLOR, JANET A. A personality scale of manifest anxiety. *J. abnorm. soc. Psychol.*, 1953, 48, 285-290.

11. TONG, J. E. The assessment of anxiety as an intervening variable in the delinquent behavior of M.D. subjects. *Brit. J. Psychol.*, 1957, 48(I), 13-25.

ASSOCIATIVE TRANSFER IN VERBAL PAIRED-ASSOCIATE LEARNING

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Most studies of transfer in verbal paired-associate learning have reported associative interference in the A-B, A-C paradigm to be slight and restricted to the early trials of List 2. In general, these experiments have used the A-B, A-C design with varying amounts of List 1 practice. The typical finding is that over-all performance improves with increasing degrees of List 1 learning, and that, even on the initial List 2 trials, the transfer changes from negative to positive with higher degrees of List 1 learning (1, 6, 7). A recent series of studies of transfer in motor paired-associate learning, using the A-B, A-C design with an A-B, D-C control for nonspecific transfer, has demonstrated performance in the A-C condition to be markedly and persistently inferior to that in the D-C condition (4). This interference was also shown to be an increasing function of amount of List 1 practice. Besch and Reynolds (2) have shown the A-C condition to result in performance inferior to that of the D-C in a verbal paired-associate task.

The present paper reports three experiments. Experiment I was conducted to determine whether or not amount of interference on the A-C condition in verbal learning is dependent on amount of List 1 practice. In Experiment II associative transfer was manipulated by instructing *Ss* to rehearse during List 1 learning. Experiment III was designed to study the effects on associative transfer of instructions in the use of mnemonic devices given during the learning of List 1.

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Child Develpm., 1960, 31, 73-87.

Experiment I

Method

Apparatus. The apparatus used was a Hunter Card Master, Model 340, (Hunter Mfg. Co., Iowa City, Iowa), designed to present 3½ in. by 6¼ in. white plastic cards before a 3 in. by 5½ in. aperture. It consists of two parts. The first unit is a metal box 9½ by 12½ by 13 in. A stack of cards may be placed in a bin and a conveyor system delivers the cards, one at a time, from the bottom of the stack to the aperture. Mounted on each card is a pair of words typed in ¼ in. upper-case letters. Two metal shutters on the aperture expose or conceal independently the left and right words on the stimulus cards. Following a presentation, the shutters close simultaneously and the card is released from the aperture and returned to the top of the stack by the conveyor belt. The second unit is a system of electronic timers which controls the rate of presenting the cards and the exposure times of the stimulus and response words. Thus, the anticipation interval, the joint-presentation interval, and the between-item interval may be independently timed.

Subjects and design. The design of the experiment is shown in Table 1. Each *S* learned two lists of stimulus-response pairs. List 1 consisted of four pairs of words, and List 2 consisted of eight pairs. Four of the stimulus words in List 2 were also the stimulus words of List 1, while the other four were new words. The response words in the two lists were different. Thus, half the pairs in List 2 are second-task pairs of an A-B, A-C sequence and the other half, pairs of an A-B, D-C sequence. Forty-four *S*s from the sixth grade of the Ottumwa (Iowa) Elementary School System[1] were randomly assigned in equal numbers to two experimental groups. Group 6 received six trials on List 1 while Group 15 received 15 trials. Within each experimental group half the *S*s were assigned to each of two subgroups (A and B of Table 1) to counterbalance for possible differential difficulty of the stimulus-response pairs of List 2. These subgroups did not differ significantly in any analyses of List 1 or List 2 performances and are collapsed in the presentation of results.

Procedure. The *S* was brought to the experimental room and seated before the apparatus with *E* seated immediately beside him. The *E* started the apparatus and asked *S* to read aloud the words in List 1 as they appeared in the aperture. At the end of the first trial the cycling of the apparatus was stopped and *S* was told that the same four pairs were to be shown again, but that this time he was to read the first word aloud and then to try to call out the word on the right before the right shutter opened. He was

[1] The author is indebted to Mr. R. O. Wright, Director of Curriculum, Ottumwa Public School System, Ottumwa, Iowa, for his generous permission to use the *S*s of this experiment. Thanks are also due Mr. Cecil M. VandeVenter, Principal of Horace Mann Elementary School, and his teaching staff, for their fine cooperation in providing facilities and for their assistance in many other ways.

TABLE 1

WORD-PAIRS OF LISTS 1 AND 2 ARRANGED TO SCHEMATIZE THE EXPERIMENTAL DESIGN

First List	*Second List*
Subgroup A	*Subgroups A and B*
cake — boat	cake — fish
sled — clown	sled — cup
drum — tent	drum — bell
train — nest	train — dog
	bird — swing
Subgroup B	pony — kite
bird — boat	coat — bus
pony — clown	clock — chair
coat — tent	
clock — nest	

also instructed to read the second word aloud if he failed to remember it correctly. During List 1 the anticipation interval was 3 sec., the joint-presentation interval was 4 sec., and the between-item interval was 2 sec.

Immediately after completing the prescribed number of trials, the List 1 cards were removed from the apparatus and the List 2 cards inserted. The change in lists required less than 30 sec. The *S* was told that the procedure for List 2 was to be the same as that for List 1. He was instructed to read aloud both words during the first trial, and during the interval between the first and second trials he was instructed to attempt to call out the second word before the right shutter opened. Throughout List 2, each of the three time intervals was 2 sec. All *S*s received 12 trials on List 2.

Three different orders of each list were given to control for serial learning. Three cards for each pair were prepared and arranged into three sets with different orders. A blank card was placed between each set so that a between-trial interval was used which was as long as the sum of the three intervals—9 sec. for List 1, 6 sec. for List 2.

All verbal responses during the anticipation interval were recorded verbatim on previously prepared sheets, but only the last response was considered in analyses of the data. All responses occurring after the opening of the right shutter were scored as omissions.

Results

In Table 2 are presented the means and SDs of the numbers of correct anticipations for different phases of learning in List 1. It is apparent that the performances of the two groups on the first six trials were quite similar. A t test showed that the difference in means was not significant ($p > .20$). The performances of the two groups on the last six trials of their respective

first tasks differ markedly, the difference between means being significant at less than the .001 level.

TABLE 2

MEANS AND STANDARD DEVIATIONS OF NUMBER OF CORRECT ANTICIPATIONS IN DIFFERENT PHASES OF LIST 1 LEARNING (EXPERIMENT I)

	First Six Trials		Second Six Trials	
Groups	*Mean*	*SD*	*Mean*	*SD*
Group 6*	7.77	3.95	7.77	3.95
Group 15	7.27	3.59	20.41	4.11

* For Group 6 the first six trials are same as the last six.

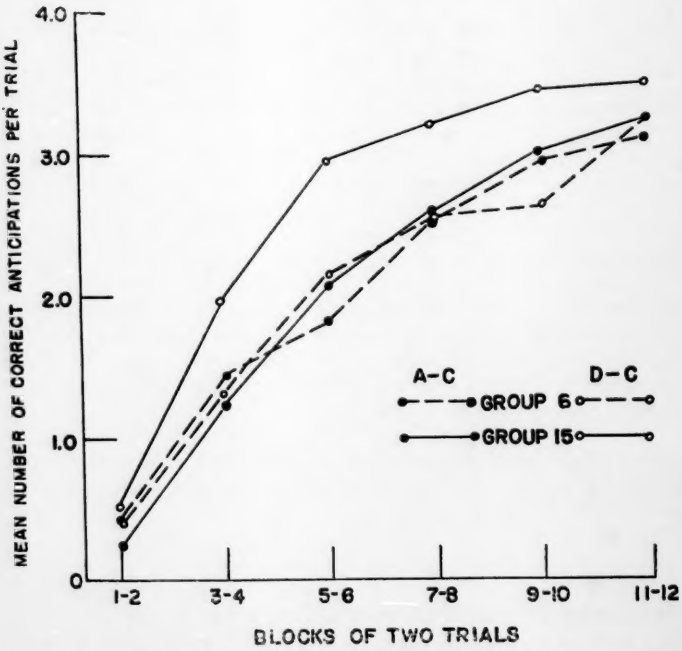

FIGURE 1—Mean number of correct anticipations per trial for blocks of two trials (Experiment I).

Figure 1 presents graphically the performance of the two groups on the A-C and D-C pairs of List 2. It is apparent that there is little difference in performance of Group 6 on the A-C and D-C pairs, while there is a large difference in these performances for Group 15. The curve for Group 15 on the D-C pairs is markedly superior to the other curves.

TABLE 3

SUMMARY ANALYSIS OF VARIANCE OF CORRECT ANTICIPATIONS IN LIST 2 (EXPERIMENT I)

Source	*df*	*Mean Square*	*F*	*p*
Subjects	43			
Groups (G)	1	40.92	1.95	
error (b)	42	20.98		
Within Subjects	484			
Trials (T)	5	406.10	250.68	.001
Conditions (C)	1	38.73	9.49	.005
T × C	5	2.97	2.86	.025
T × G	5	3.51	2.17	
C × G	1	37.66	9.23	.005
T × C × G	5	1.78	1.71	
error (w)	462			
$error_1$ (w)*	210	1.62		
$error_2$ (w)†	42	4.08		
$error_3$ (w)‡	210	1.04		

* Error for T and T × G.
† Error for C and C × G.
‡ Error for T × C and T × C × G.

Table 3 presents a summary of the analysis of variance of the data represented in Figure 1. The design is of the "mixed" type (3, Type VI, p. 292) with training "Groups" as a between-*S* factor and "Trials" and "Conditions" as intra-*S* factors. The significant Conditions effect reflects the superiority of performance on the D-C pairs. The interaction between Condition and Trials indicates that the superiority of the D-C curve increases with practice. The interaction of Conditions and Groups reflects the relatively greater superiority of the D-C condition for Group 15 than for Group 6.

A simple analysis of variance was conducted with the number of correct anticipations for the two groups on the A-C and on the D-C conditions separately. The A-C means did not differ significantly ($F < 1.0$), while the difference between the D-C means was significant ($p < .025$).

Since response omissions constituted a majority of all errors on List 2, this response measure was analyzed separately. The total number of omissions for the A-C and D-C conditions were obtained for each *S*. These data

were then subjected to an analysis of variance in which Groups was a between-*S* factor and Conditions was an intra-*S* factor (3, Type I, p. 267). Both the Conditions effect and its interaction with Groups were significant ($p < .001$).

Experiment II

Experiment II was conducted in an attempt to identify one of the sources of positive transfer in the type of design represented in Experiment I. Since amount of first-task practice was shown to affect performance on the D-C pairs, it was expected that, if *S*s were instructed to rehearse during the joint-presentation interval, there would be superior performance on the D-C condition and a greater amount of interference relative to *S*s not instructed to rehearse.

Method

Apparatus, subjects, and design. The apparatus, lists, and design were identical to those used in Experiment I. The *S*s were fifth- and sixth-grade children from the Ottumwa Public School system.[2] Eighteen *S*s were assigned at random to each of two groups. Group R (rehearsal) was given special instructions which Group C (control) did not receive. One half the *S*s in each group were assigned to one of the two counterbalancing subgroups shown in Table 1.

Procedure. The procedure of Experiment II was the same as that of Experiment I except that nine first-task trials were given all *S*s, and, following the first *anticipation* trial of List 1, the apparatus was stopped to administer the special instructions. Group R was then given the following instructions, while Group C received only those not italicized.

> "This test is not as easy as it looks, is it? That is because the shutter doesn't give you much time to remember. *Now, I'm going to tell you about a trick that people use who do well on this test.* You remember that as soon as the first shutter opens, you read the word on the left. Then you try to remember the word on the right. If you can't remember, or if you say the wrong word, then you read the word aloud just as soon as the other shutter opens. *Remember that both shutters are open then. This is where the trick comes in. While both shutters are open, people who do well on this test read the word on the left then the word on the right, then the word on the left, then the word on the right, and so on. This way, they can sneak in two or three extra practice trials for each card. People who don't do well on this test don't use that time to practice. So try this trick and see if it doesn't help you.* You are going to get several chances to remember and learn words, so don't worry about your mistakes too much. Everyone makes mistakes at first. Ready?"

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[2] The *S*s of Experiments II and III were also obtained from the Ottumwa Public Schools. The author is indebted to Mr. R. O. Wright for permission to use the *S*s and to Principal Andrew G. Howard and his staff at Lincoln Elementary School for their excellent cooperation during the conduct of these experiments.

At the end of the first list *E* changed the cards, instructed *S* that a new list was to be learned, and for Group R only said, "Don't forget the trick I told you about."

TABLE 4

MEAN NUMBER OF CORRECT ANTICIPATIONS DURING LIST 1 (EXPERIMENT II)

	Blocks of Two Trials				
Group	*2–3*	*4–5*	*6–7*	*8–9*	*Total*
Group R	1.39	4.00	5.83	6.50	17.72
Group C	1.39	3.39	4.33	5.17	14.28

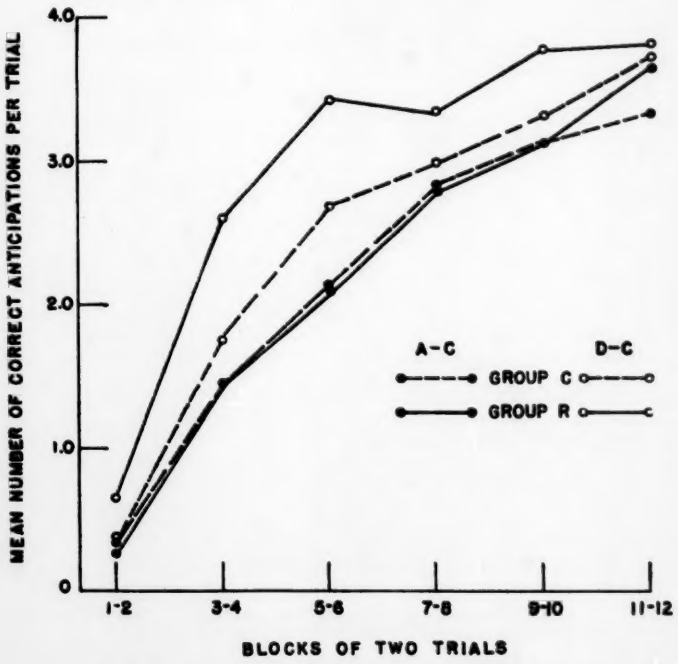

FIGURE 2—Mean number of correct anticipations per trial for blocks of two trials (Experiment II).

Results

The means of the number of correct anticipations per two-trial block are shown in Table 4 for List 1. The means for the first two anticipation trials (Trials 2 and 3) were identical for Groups R and C, suggesting that the two groups were initially equal in ability. It should be noted that any effects of the rehearsal instructions should not appear until after the second trial. The difference between means of total correct anticipations for the two groups was significant ($p < .05$).

Figure 2 presents graphically the mean number of correct anticipations on the A-C and D-C pairs in List 2. It is seen that the difference in performance on the A-C and D-C pairs is greater for Group R than for Group C and that the D-C curve for Group R is markedly superior to the other curves.

TABLE 5

SUMMARY ANALYSIS OF VARIANCE OF CORRECT ANTICIPATIONS ON LIST 2 (EXPERIMENT II)

Source	*df*	*Mean Square*	*F*	*p*
Subjects	35			
Groups (G)	1	25.52	2.06	
error (b)	34	12.36		
Within Subjects	396			
Trials (T)	5	416.92	320.71	.001
Conditions (C)	1	101.11	34.04	.001
T × G	5	1.06	< 1.00	
T × C	5	5.87	6.11	.001
C × G	1	19.17	6.45	.025
T × C × G	5	2.51	2.61	.025
error (w)	374			
$error_1$ (w)*	170	1.30		
$error_2$ (w)†	34	2.97		
$error_3$ (w)‡	170	0.96		

* Error for T and T × G.
† Error for C and C × G.
‡ Error for T × C and T × C × G.

Table 5 presents a summary analysis of variance of the data in Figure 2. The over-all difference between the A-C and the D-C performance (Conditions) was significant at a high level of confidence ($p < .001$). The interaction of Conditions and Trials was also significant. The interaction of Conditions and Groups, reflecting the greater interference for Group R, was also significant ($p < .025$). The latter effect was found to interact significantly with Trials, indicating that the amount of interference increases

with trials, at least through the range of List 2 practice used in the present experiment.

A simple analysis of variance was performed separately on the number of correct anticipations in the A-C and in the D-C conditions. The two groups did not differ significantly in performance on A-C pairs ($F < 1.0$), but the difference between means on the D-C pairs was significant ($p < .01$). For Group C the difference between A-C and D-C means was significant at the .05 level and for Group R, at less than the .001 level, by the related t test.

As in Experiment I, an analysis of response omissions was conducted. The Conditions and the Conditions by Groups effects were found to be significant at about the same levels of confidence as were found for correct anticipations.

Experiment III

Experiment III was conducted with the remaining 24 available *Ss* in an attempt to determine whether or not teaching the use of mnemonic devices in the first task would transfer to the second task. Several *Ss* had reported the use of mnemonics during the learning of the tasks. It seemed likely that experimental instruction in this procedure would have much the same effect as increased first-task practice or instructions to rehearse.

Method

Apparatus, subjects, and design. The apparatus and lists were the same as those of Experiments I and II. Twenty-four fifth-grade *Ss*[2] were randomly assigned in equal numbers to Group M (mnemonic) and to Group C (control). One *S* from each group was eliminated due to apparatus failure. Six *Ss* from each group were assigned to Subgroup A and five from each to Subgroup B (Table 1).

Procedure. The procedures for Group C of Experiment III were the same as those for Group C of Experiment II. Group M differed from Group R of Experiment II only in the nature of the instructions. The instructions for Group M differed somewhat for Subgroups A and B and for brevity are not reported here in detail. Each *S* in the group was informed that *E* was going to tell him about a trick that would help him learn the list. The *E* then illustrated a mnemonic device for each of the four pairs of List 1. The *S* was instructed to visualize a "cake-boat," that is, a boat made of cake; a clown riding on a sled; someone playing a drum in a tent; etc. An attempt was made to make each of the associations mildly humorous. Although there was probably considerable difference in effectiveness of the mnemonics, the two subgroups of Group M learned List 1 at about the same rate and did not differ systematically on List 2. Following the presentation of List 1, *E* suggested that the trick had helped and that during the next list *S* should invent his own devices.

Results

The mean of the number of correct anticipations on List 1 are shown in Table 6 for two-trial blocks. Groups M and C differ on the first block of two anticipation trials. Since the mnemonic instructions were given following the first anticipation trial, their effects on List 1 should begin to

TABLE 6

MEAN NUMBER OF CORRECT ANTICIPATIONS ON LIST 1 PER BLOCK OF TWO TRIALS (EXPERIMENT III)

	Blocks of Two Trials				
Group	*2–3*	*4–5*	*6–7*	*8–9*	*Total*
Group M	3.73	6.64	7.09	7.91	25.36
Group C	2.09	3.18	3.82	4.45	13.54

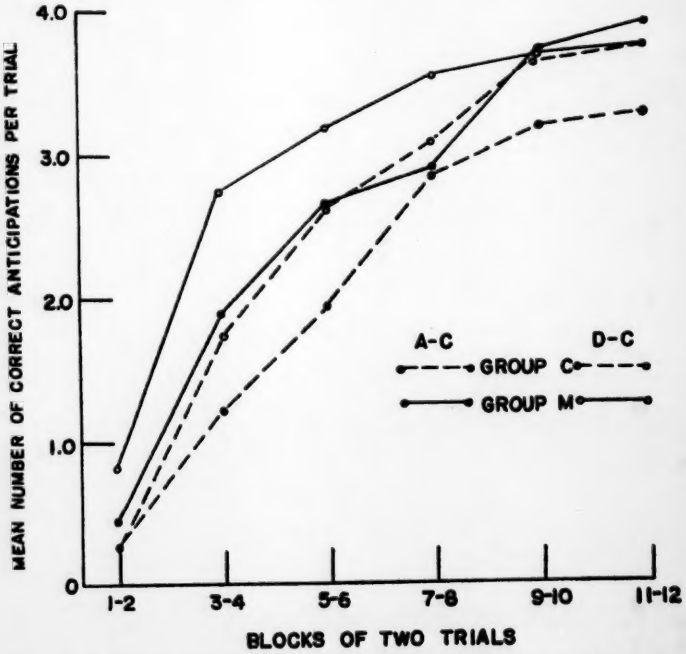

FIGURE 3—Mean number of correct anticipations per trial for blocks of two trials (Experiment III).

appear on the second anticipation trial (Trial 3). The difference between mean total correct anticipations for the two groups was significant ($p < .001$).

Figure 3 presents the means of the number of correct anticipations on the A-C and D-C pairs in List 2. The performance of both groups on the D-C pairs was superior to that on the A-C pairs. Group M performed better than Group C on either type of pair. Only early in the learning of List 2 does it appear that Group M shows more interference than Group C. During the later trials Group C has a larger difference in A-C and D-C performances than does Group M.

TABLE 7

SUMMARY ANALYSIS OF VARIANCE OF CORRECT ANTICIPATIONS ON LIST 2 (EXPERIMENT III)

Source	*df*	*Mean Square*	*F*	*p*
Between *Ss*	21			
Groups (G)	1	52.74	4.41	.05
error (b)	20	11.97		
Within *Ss*	242			
Trials (T)	5	259.34	212.57	.001
Conditions (C)	1	36.38	10.92	.005
T × G	5	2.36	1.93	.10
T × C	5	2.33	3.28	.01
C × G	1	0.06	< 1.00	
T × C × G	5	2.35	3.31	.01
error (w)	220			
$error_1$ (w)*	100	1.22		
$error_2$ (w)†	20	3.33		
$error_3$ (w)‡	100	0.71		

* Error for T and T × G.
† Error for C and C × G.
‡ Error for T × C and T × C × G.

Table 7 presents a summary of the analysis of the data in Figure 3. The difference between groups, disregarding conditions, was significant at the .05 level. The presence of interference, disregarding groups, is indicated both by the significant Conditions effect and by the significant Trials by Conditions interaction. Although the Conditions by Groups interaction was negligible, the significant triple interaction shows that this effect varies with trials. Interference is greater for Group M during the early trials, but is greater for Group C during the later trials. The sizeable, though nonsignificant, Trials by Groups interaction reflects the greater superiority of Group M, disregarding conditions, during the earlier than during the later trials. Analyses of response omissions gave essentially the same results.

Discussion

The results of Experiment I demonstrate that the major findings with respect to associative transfer in motor paired-associate learning (4) also hold in verbal learning. Increasing the amount of Task I practice does not result in increasingly poorer performance on the A-C condition, but it does result in increasingly better performance on the D-C condition. In experiments designed like the present ones, associative interference must be measured by the difference between D-C and A-C performance, since only in such a comparison is the associative facilitation from nonspecific sources controlled. It is interesting that the means of the number of correct anticipations on the A-C condition during the first two anticipation trials of List 2 were 2.18 for Group 6 and 1.41 for Group 15, a difference significant at the .05 level. The net transfer on the A-C condition during the first two anticipation trials is negative, changing to positive after the third trial (Fig. 1). This finding agrees with those of other studies in which performance on the A-C condition only was studied as a function of amount of Task 1 practice (1, 5, 6, 7).

The results of Experiment II indicate that the effects of instructing *Ss* to rehearse during the joint-presentation interval are similar to the effects produced by increasing the amount of List 1 practice. Both procedures improved performance on the D-C pairs (associative facilitation) and increased the difference between A-C and D-C performance (associative interference), whether the response measure was omissions or correct anticipations. It is also interesting to note that Group C of Experiment II was given nine trials on List 1 but was otherwise treated like Groups 6 and 15 of Experiment I. Although the *Ss* of Group C were not run concurrently with those of Experiment I, comparison of their performance curves in Figure 2 with those in Figure 1 shows that the amount of associative facilitation for Group C was between that for Group 6 and Group 15 and the amount of associative interference was greater than that for Group 6 but less than that for Group 15.

The results of Experiment III indicate that instructions in mnemonics in List 1 has transfer effects similar to those of increased List 1 practice and instructions to rehearse. One difference is that the increased interference resulting from the use of mnemonics is present only in the early stages of List 2 learning and is overcome relatively more rapidly, presumably due to the effectiveness of the use of new mnemonic devices.

The results of Experiments II and III thus demonstrate what may be two important sources of associative transfer in the A-B, A-C sequence. During List 1 practice naive *Ss* may discover the rehearsal and mnemonic techniques independently of special instructions. With increasing amounts of List 1 practice, larger and larger numbers of the *Ss* may discover one or both of these techniques.

An important finding in all three experiments concerns the crucial role that omissions play in List 2 performance. Table 8 presents the means of different types of error during List 2 learning. Omissions are failures to respond within the 2-sec. anticipation interval. Intralist errors involve giving response words that are correct for some other stimulus word. First-task intrusions involve giving response words from List 1. Other errors consist primarily in giving a stimulus word as a response word. It is apparent that intralist errors are the only important source of List 2 error, except for omissions. The omissions account for 67 to 92 per cent of all errors. In view of the predominance of errors of omission, it is not surpris-

TABLE 8

MEANS OF DIFFERENT TYPES OF ERRORS ON LIST 2 FOR EACH GROUP UNDER EACH CONDITION

EXPERIMENT I

	Group 6		Group 15	
Type of Error	*A-C*	*D-C*	*A-C*	*D-C*
Response Omissions	15.73	15.64	18.23	12.95
Intralist	6.64	6.59	4.82	3.77
First-Task Intrusions	0.45	0.27	0.04	0.00
Other	0.68	0.95	0.27	0.18
Total	23.50	23.45	23.36	16.90

EXPERIMENT II

	Group C		Group R	
Type of Error	*A-C*	*D-C*	*A-C*	*D-C*
Response Omissions	17.00	14.06	18.44	10.67
Intralist	4.11	3.72	2.28	1.94
First-Task Intrusions	0.00	0.00	0.00	0.05
Other	0.28	0.33	0.28	0.00
Total	21.39	18.11	21.00	12.67

EXPERIMENT III

	Group C		Group M	
Type of Error	*A-C*	*D-C*	*A-C*	*D-C*
Response Omissions	16.64	14.27	15.54	10.82
Intralist	5.72	3.45	1.36	1.73
First-Task Intrusions	0.00	0.00	0.00	0.09
Other	0.09	0.09	0.00	0.00
Total	22.45	17.81	16.91	12.64

ing to find in these experiments that omissions are more sensitive to interference than is any other type of error. It might be expected that, if it is feasible to obtain reliable measures of response latencies in the verbal task, the latencies of correct anticipations on the A-C pairs will increase with increasing degrees of List 1 learning. It should be emphasized that the *Ss* in all three experiments were required to verbalize the stimulus word aloud prior to anticipating the response word. This procedure effectively reduces anticipation time somewhat, probably increasing the number of omissions considerably.

Summary

This paper reported three experiments on associative transfer in verbal paired-associate learning. All three experiments used the A-B, A-C sequence with an A-B, D-C intra-*S* control. List 1 consisted of four pairs of words, while List 2 consisted of eight pairs. Four of the stimulus words of List 2 were the same as the stimulus words of List 1 (A-C condition) and four were different (D-C condition). All response words of List 2 were different from those of List 1. In Experiment I, 22 sixth-grade *Ss* were given six trials on List 1 (Group 6) and 22 were given 15 trials on List 1 (Group 15). Both groups received 12 trials on List 2. It was found that Group 15 showed significantly better performance on the D-C condition than did Group 6, and the difference between A-C and D-C performance was significantly greater for Group 15 than for Group 6. The latter finding was interpreted as evidence for greater interference for Group 15.

In Experiment II, 18 fifth- and sixth-grade *Ss* were instructed to rehearse between the presentations of successive pairs of List 1, while 18 control *Ss* were not so instructed. Both groups were given nine first-task trials and 12 second-task trials. The results indicated that the rehearsal instructions had effects similar to those of an increased amount of first-task practice.

In Experiment III, 11 fifth-grade *Ss* were instructed in the use of mnemonic devices during List 1 (Group M) and 11 were not given such instructions (Group C). The conditions of Experiment III were otherwise the same as those for Experiment II. Group M performed significantly better than Group C on both conditions, significant interference was found for both groups, and the greater interference of Group M compared to Group C was restricted to the early trials of List 2.

References

1. Atwater, S. K. Proactive inhibition and associative facilitation as affected by degree of prior learning. *J. exp. Psychol.*, 1953, 46, 400-404.
2. Besch, N. F., & Reynolds, W. F. Associative interference in verbal paired-associate learning. *J. exp. Psychol.*, 1958, 55, 554-558.

3. LINDQUIST, E. F. *Design and analysis of experiments in psychology and education.* Boston: Houghton Mifflin, 1953.

4. SPIKER, C. C., & HOLTON, RUTH B. Associative transfer in motor paired-associate learning as a function of amount of first-task practice. *J. exp. Psychol.,* 1958, 56, 123-132.

5. UNDERWOOD, B. J. Associative inhibition in the learning of successive paired-associate lists. *J. exp. Psychol.,* 1944, 34, 127-135.

6. UNDERWOOD, B. J. Proactive inhibition as a function of time and degree of prior learning. *J. exp. Psychol.,* 1949, 39, 24-34.

7. UNDERWOOD, B. J. Associative transfer in verbal learning as a function of response similarity and degree of first-list learning. *J exp. Psychol.,* 1951, 42, 44-53.

CHILD-REARING ANTECEDENTS OF MASCULINE IDENTIFICATION IN KINDERGARTEN BOYS[1]

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The concept of identification is undoubtedly one of the most prominent in the literature on personality development. Theoretical discussions of the concept are numerous (e.g., 2, 7, 8, 9, 12, 14, 17), and recently there have been a number of studies testing hypotheses derived from these theoretical writings (e.g., 13, 15, 18, 20).

Empirical investigations of the concept have customarily used, as operational indices of degree of identification with parents, measures of either (a) degree of "real" or "assumed" similarity between parent and child (4, 15, 24) or (b) personality characteristics or behavioral manifestations which are presumably consequents of the identification process, e.g., aggression (10), high conscience (20), use of the father doll in play (18).

Hypotheses about the antecedents and consequents of strong or weak identification with parents are tested by correlating an index of identification with measures of theoretically relevant variables. Thus, using the amount of use of the father doll as an index of identification with the father, Pauline Sears (18) showed that five-year-old boys with warm and affectionate fathers (as judged from interviews) identified with them more strongly. Similarly, it has been found that adolescent boys who respond to personality and attitude tests as their fathers do—a consequence of the boys' strong identifications with their fathers—are more likely, according to projective test responses, to view their fathers as highly nurturant and

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rewarding (15). According to another study, a high degree of conscience development in kindergarten children, presumably an index of parental identification, is related to the mother's warmth and acceptance and to her use of withdrawal of love as a method of control. For boys, acceptance by the father was also found to be related to this index (20).

Adequate sex-typing, or acquisition of the personality characteristics, behavior, and attitudes appropriate to the child's own sex, is generally considered to be a major consequent of strong identification with the like-sexed parent (12, 19). For this reason the present authors, in an earlier study, used a measure of sex-typing of interests in young boys as an index of identification with the father (13). In that study three hypotheses about the antecedents of identification were tested by comparing the responses of two groups of five-year-old boys—one group high and one group low in masculinity as measured by the ITSC (3)—to nine semistructured familial doll play stories. Analyses of the doll play protocols indicated that highly masculine (i.e., highly father identified) boys viewed their fathers as powerful sources of both reward and punishment. These data thus seemed to support both the developmental and defensive hypotheses of identification, i.e., boys highly identified with their fathers perceived them as more nurturant and rewarding (as the developmental identification hypothesis would predict) *and* as more threatening and punitive (in accordance with the defensive identification hypothesis). The authors concluded, however, that "role theory with its explicit emphasis on the importance of both reward and punishment in role learning best integrates all these data" (13, p. 17).

It must be emphasized that these findings on correlates of masculinity were based only on the child's *perceptions* of his relationship with his parents, as these were reflected in his doll play. The present study, essentially an extension of the earlier one, is focused on the relationship between degree of sex-typing in young boys and their parents' child-rearing practices. Information on these practices was obtained from interviews with the mothers.[2]

The purpose of the study was to test three major hypotheses (developmental, defensive, and role-taking) about the factors underlying the identification process—and thus to check the conclusions of earlier studies—with another, perhaps more objective, kind of data on family relations. More specifically, we wanted to evaluate the behavior of the fathers of the strongly father-identified (i.e., highly masculine) group toward their sons. Do they tend to act (a) warmly and affectionately, (b) punitively and threateningly, or (c) as powerful agents of both rewards and punishments?

Since the interview data of the present study are in many respects like those of the Sears *et al.* (20) study, including information on conscience development, we could also determine whether or not different presumed

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[2] The authors are grateful to Mrs. Marie Mustache for her invaluable aid in conducting the interviews and making the ratings.

consequents of the identification process—high degree of sex-typing and conscience development—are related to each other and are associated with the same child-rearing variables.

Procedure

The basic data about child-rearing practices were obtained from the mothers of the kindergarten boys who were subjects in the authors' earlier study of masculinity and identification (13). The boys had been selected from among 38 white boys, pupils in two kindergarten classes of a predominantly middle-class public school, who had been given the IT Scale, a projective test of sex-role preference (3). Nine of the interviewees were the mothers of boys with the highest (most masculine) scores on the ITSC, and 10 were the mothers of boys with the lowest (least masculine) scores. It must be emphasized that *all* the data, including those pertaining to fathers' attitudes and practices, are derived from mothers' reports.

For many reasons the interviews had to be limited to between one half hour and one hour; hence the interview schedule was a relatively short one. It consisted of 32 open-ended questions, some of them with suggested probes taken from the interview schedule used by Sears *et al.* (20, Appendix A). Almost all the questions concerned the areas most directly relevant to theories of identification and to conscience development. They related to restrictions and demands on the child, use of praise in discipline, warmth, affection, and punitiveness of each parent, the child's dependence and his proneness to confess wrongdoing. The following two questions are illustrative:

> How often do you spank X? [Probes: (a) How about your husband? How often does he spank him? (b) For instance, how often has X been spanked in the last two weeks?]
>
> Now we'd like to talk awhile about X and his father. Will you tell me something about the way they act toward each other? [Probes: (a) For instance, when your husband comes home from work, when X is there, what happens? (b) How about after dinner? (c) What other kinds of things do they do together?]

All the interviews were conducted by a trained social worker who asked the questions in the prescribed order and using the exact wording given in the schedule. She took extensive notes on each interview, recording as much as possible verbatim.

After she had completed all the interviews, the social worker rated each of them on 28 dimensions. The rating scales, taken from Appendix B of *Patterns of Child Rearing* (20), are listed in Table 1.

In order to eliminate any bias in her work, the social worker was not informed of the real purpose of the research until after she had finished all of her work. Therefore, neither her interviews nor her ratings could have been influenced by knowledge of the hypotheses or the method of selecting the interviewees.

TABLE 1

DIFFERENCES BETWEEN HIGH AND LOW MASCULINITY GROUPS ON RATING SCALES OF FAMILIAL VARIABLES AND CONSCIENCE DEVELOPMENT

Rating Scale	*U*	*p*	*Direction of Differences Between Groups*
Father-Son Relationships Variables			
Father's standard of obedience	35.0	*ns*	
Frequency with which *father* spanks	37.5	*ns*	
How child and father act toward each other	12.0	.001–.01	Highs have more affectionate relations
Amount of caretaking father does now	31.5	.14*	Highs = more caretaking by father
Affectional bond, father to child	13.5	.001–.01	Highs = fathers warmer
Strictness of father	40.5	*ns*	
Mother-Son Relationships Variables			
Mother's standard of obedience	34.5	*ns*	
Amount of mother's affectionate demonstration	43.5	*ns*	
Amount of time mother plays with child	33.0	*ns*	
Warmth, mother to child	33.0	*ns*	
Frequency with which *mother* spanks	32.0	.14*	Lows = spanked more frequently
Family Climate Variables			
Praise for good behavior at table	40.5	*ns*	
Strictness about bedtime	35.0	*ns*	
Strictness about noise	19.0	.025	Lows = parents more strict
Restrictions on physical mobility	40.5	*ns*	
Amount of praise for obedience	32.0	.14*	Highs = praised more
Amount of attention child wants	31.5	*ns*	
Sex role differentiation	45.0	*ns*	
Permissiveness for aggression toward parents	37.5	*ns*	
Punishment for aggression toward parents	36.5	*ns*	
Extent of use of tangible rewards	43.0	*ns*	
Extent of use of praise	18.0	.01 –.025	Highs = praise used more often
Parents' agreement on child-rearing policies	33.0	*ns*	
Responsibility for child-rearing policies	30.5	.12*	Highs = father has more responsibility
Division of labor between husband and wife	23.0	.05	Highs = less division of labor
Conscience Development Variables			
Spontaneous telling of deviations	30.5	.12*	Highs = tell more often
Does child admit deviations when asked	12.5	.001–.01	Highs = admit to deviations
Evidence of conscience development	26.0	.05 –.10	Highs = more evidence of conscience

* *p* values estimated by the Z transformation method (23).

Results

Testing the hypotheses required determining the relationships between masculinity status, on the one hand, and child-rearing practices, the child's relationship with his parents, and conscience development, on the other. This was accomplished by comparing the low and high masculinity groups on each of the 28 variables on which they had been rated.

Since the number of subjects in each group was small and the distributions of ratings were not normal, U tests (11) were used to compare rank transformation scores on all ratings of subjects in the two groups. The results of these tests and the significance levels, together with the meanings of the significant differences and trends in the data, are summarized in Table 1.

The two groups differed significantly or almost significantly in seven of the 28 rated variables. There were some additional trends in the data; that is, there were five variables on which the two groups tended to be rated differently, although the differences were not statistically significant. In general, these trends are consistent with, and support, the statistically significant differences between the two groups.

The findings are particularly relevant to three broad areas—father-son relationships, family climate, and conscience development—and will therefore be presented in three sections.

Father-Son Relationships

As Table 1 indicates, the high and low masculinity groups differed in a number of familial variables. The data of the present study, like those of earlier ones (13, 15, 21), show that sex-typing of interests is more directly related to boys' interactions with their fathers than with their mothers. While none of the variables pertaining to mother-son relationships significantly differentiated the two groups, several of the variables of father-son interaction did. The differences were most clear-cut in two variables: (a) the highly masculine boys and their fathers were rated as "acting more affectionately toward each other"; and (b) the father-to-child affectional bonds are stronger in the case of the boys in this group.

These findings clearly lend support to the developmental identification hypothesis. They confirm the prediction, based on that hypothesis, that young boys are more likely to identify strongly with their fathers, and thus to acquire appropriately sex-typed responses, if their relationships with them are rewarding, warm, and affectionate.

Some additional trends in the data suggest that, if the father plays a very active role in his son's upbringing, the boy is more likely to develop strong masculine identification. Thus, compared with the fathers of the low masculine group, the fathers of highly masculine sons tended to take care of their sons more frequently and to have greater responsibility for the family's child-rearing policies. While these differences between the groups

were not statistically significant, the findings suggest that the degree of the young boy's masculinity is related to the frequency and intensity of his contacts with his father and to the latter's influence in determining how the child is handled.

These trends, together with the significant findings about the warmth and affection of the fathers of highly masculine boys, may also be interpreted as evidence supportive of the role-taking hypothesis of identification. According to this hypothesis, a boy will be most strongly motivated to identify with his father, or, in role theory terms, to imitate him or take on his role, if he has intensive interactions with that parent and regards him as having a great deal of power. Predictions derived from this hypothesis appear to be confirmed by these data. Thus, it seems reasonable to infer that, since they are warm and affectionate, the fathers of highly masculine boys interact more frequently and more intensively with their sons. Therefore, these boys have more experience in practicing their appropriate sex roles. Moreover, since these fathers tend to take care of their sons often and, to a great extent, determine the techniques of disciplining the child, they do, in fact, have a great deal of power over the child, i.e., they can control his rewards and punishments. In short, these data seem to be consistent with the role-taking, as well as the developmental, hypothesis of identification.

None of the data of this study support the hypothesis of defensive identification, which maintains that high masculine identification is a consequence of the father being threatening and punitive. Ratings of the father's standards of obedience for the child, his frequency of spanking, and his strictness, based on the mothers' reports, did not significantly differentiate the high and low masculinity groups.

Family Climate

There is some evidence that, in addition to experiencing different kinds of father-son relationships, the two groups also encounter different general home atmospheres. Compared with the other group, the families of the highly masculine boys appeared to be more permissive, easygoing, more love-oriented, and less punitive in their disciplinary techniques. More specifically, as Table 1 indicates, the families of the highly masculine boys were less strict about noise in the home and more frequently used praise as a technique of discipline.

Other trends in the data give further support to these statistically significant findings. Highly masculine boys tended to be spanked less by their mothers and to get less praise for obedience. Since these boys' parents make more use of praise generally, their tendency to use less praise specifically for obedience may indicate that they place relatively less emphasis on this characteristic and thus maintain less strict, more permissive home atmospheres.

Moreover, the highly masculine boys tended to be less attention-seeking —and, by inference, less dependent—than their peers who were relatively

low in masculinity. Interpreted in the light of findings of other studies, this may indicate that the high group experiences more maternal nurturance (22), less maternal rejection, and less punishment for dependency (20). While it must be emphasized that these last findings represent suggestive trends rather than statistically significant differences between groups, they give some further evidence that appropriate sex-typing is fostered by a warm and permissive familial milieu.

One other familial variable, division of labor between husband and wife, significantly differentiated the two groups. According to mothers' reports, the families of the highly masculine-identified boys are characterized by fewer specifically "mother" and "father" tasks and a greater tendency for each parent to help with all tasks. The relative paucity of rules regarding duties may be another reflection of the relaxed climate of the home of the highly identified child. It may also indicate a generally harmonious family situation in which the parents can depend on each other's assistance without regulations about assignments. As Mowrer (12) has suggested, in the harmonious family both parents are likely to reward the boy's imitation of his father. Thus, both encourage the boy to identify with his father and in this way promote the development of a high degree of masculinity.

Conscience Development

If, as is generally assumed, appropriate sex-typing and high conscience development are both products of the process of parental identification, it would be predicted that independent measures of these two variables would be related. The findings confirm this prediction and thus support the underlying assumption. As may be seen in Table 1, highly masculine boys were rated higher than boys low in masculinity in measures of conscience development. More specifically, the former group received higher ratings in the variables, "admitting deviations when asked" and "evidence of conscience development," an over-all rating of superego. Moreover, there was a tendency for the highly masculine to be rated higher on the variable "tells about deviation," which referred to the child's proneness to confess wrong-doing spontaneously.

Discussion

The interpretation of the findings is somewhat complicated by the fact that the data were derived exclusively from mothers' reports of their own and the fathers' behavior. The data on fathers' attitudes and general family climate may therefore be confounded. For example, reports that the fathers of highly masculine boys are affectionate might be a function of the mothers' view of the family climate as warm and permissive, rather than a specific commentary on the fathers' behavior. Nevertheless, the results of the present study are consistent with other empirical findings and with developmental and role theories of identification. The authors have previ-

ously reported that highly masculine kindergarten boys perceive their fathers as warm, nurturant, and rewarding (13), and the data of the present study suggest that, at least according to the mothers' replies, these fathers' overt behavior is characteristically affectionate. The consistency of the findings from two independently derived sets of data supports the validity of the developmental hypothesis of identification.

The present findings may also be interpreted as lending support to the role theory of identification. If the fathers of highly masculine boys are in fact more affectionate, they probably interact frequently and intensely with their sons. Furthermore, they tend to be influential in determining child-rearing policies and hence probably exercise considerable power over the boys. These two characteristics of the father—a high level of interaction with the son and great power over him—are, according to role theory, the primary prerequisites of the boy's strong identification with him.

The present data indicate that highly masculine boys live in relatively permissive, nonpunitive family climates. It seems plausible to infer that boys in such families are happier and more relaxed in their relationships with their parents than boys from stricter homes. Under these circumstances they are likely to seek frequent contact with their parents and to be relatively uninhibited in trying out many imitative responses in their presence. Responses that are appropriately sex-typed will be rewarded and hence will gain in habit strength, while inappropriate responses will not be rewarded and thus will be weakened or extinguished. In a stricter, more rigid home the child may tend to withdraw from his parents and, for this reason, will have less opportunity to learn which responses are most appropriate to his sex role.

While the findings based on mothers' reports of father-son relations and family climate were generally congruent with those discovered in the analysis of children's perceptions of their families, the two sets of data yielded different results for variables pertaining to father punishment and threat potential. Differences in the doll play responses of boys high and low in masculinity tended to support the defensive identification hypothesis, i.e., the former *perceived* their fathers as more punitive and threatening (13). According to the mothers' reports, however, the fathers of highly masculine boys did not *behave* more punitively or threateningly toward their sons than the fathers of boys low in masculinity. The data of the present study thus lend no support to the defensive identification hypothesis. There are no data that enable us to determine whether the child's or the mother's perceptions are more in accord with reality. The highly masculine boys' perceptions of their fathers may be related to the fact that these boys interact more with their fathers, and, consequently, in their doll play use the father dolls more prominently as agents of both nurturance and punishment. Thus, the threatening qualities attributed to the fathers in doll play may reflect, not their actual behavior, but their salience in the lives of their sons. On the other hand, it is equally possible that these fathers actually

are, or have been, severe in their treatment of their sons. The mothers, however, viewing their husbands as affectionate toward their sons, may be unwilling or unable to admit the punitive aspects of the fathers' behavior. The problem can probably be solved only by systematic observations of father-son interactions among those high and low in masculinity.

Another finding of the study—the association between high degrees of masculinity in boys, assumed to be a manifestation of strong father identification and highly developed conscience, the index of identification used by Sears, Maccoby, and Levin (20)—merits discussion. Both measures have been found to be related to the high use of praise by parents and, more generally, to the use of love-oriented techniques of discipline. However, warmth and acceptance by the mother and acceptance by the father were found to be antecedents of a high degree of conscience development in kindergarten boys (20), while the father's warmth and affection, not the mother's, were found to be related to masculinity in boys this age. On theoretical and empirical grounds, it is reasonable to consider both conscience development and masculinity as signs of identification, but the two characteristics appear to have different correlates or antecedents.

In the process of ego and superego development the child undoubtedly has not one, but a number of identification models. Different aspects of his psychological structure become modeled after different identificands. Thus, for the five-year-old boy both parents probably serve as models for conscience development; that is, his moral values and ethical standards are products of identifications with his mother *and* father.[3] If this is true, then, according to the developmental identification hypothesis, a high degree of conscience development would depend upon positive affectional relationships between the child and *both* parents. Viewed in this way, association between the boy's high level of conscience and both his parents' acceptance and warmth (20) was to be anticipated. The same finding may also be interpreted as confirmation of a prediction based on role theory. Insofar as warm and affectionate parents interact more with their children, these children would be expected to identify strongly with them, to adopt more of their characteristics, and, consequently, to develop strong conscience.

The boy's adoption of masculine interests, on the other hand, must be almost exclusively the product of his identification with his father, for he is the parent who serves as the model for masculinity. Since the mother obviously cannot be the model for this, her role in her son's acquisition of masculine characteristics cannot be as vital as the father's. Therefore, according to the developmental identification hypothesis, appropriate sex-typing for the boy is a consequent of warm and affectionate interactions with his father, while his relationships with his mother are less important in this respect. Analogously, according to role theory, the amount and

[3] It is, of course, possible that ultimately the boy's conscience will be modeled primarily after his father's, but during the preschool period his standards are more likely to be adopted from both parents.

intensity of father-son, but not mother-son, interactions determine the masculinity of the boy's behavior and interests. The data of this study substantiate this reasoning. High degrees of masculinity were in fact fostered by affectionate—and, by inference, frequent and intense—father-son interactions, but were not significantly affected by mother-son relationships.

Summary

The mothers of 19 boys, nine of them high and 10 of them low in masculinity as measured by the IT Scale, were interviewed about their own and their husbands' child-rearing practices and the boys' conscience development. On the basis of these interviews ratings were made on 28 variables of father-son relationships, family climate, and conscience.

The major findings were as follows:

1. The variables of father-son relationships are more directly associated with sex-typing than are those pertaining to mother-son relations.

2. According to mothers' reports the fathers of the highly masculine group had stronger affectional bonds, and acted more affectionately, toward their sons than did the fathers of boys low in masculinity. These findings appear to support the developmental hypothesis of identification.

3. There were trends in the data that suggest that the fathers of the highly masculine group play a greater role in their son's upbringing, doing more of their sons' caretaking and having greater responsibility for child-rearing policies. These trends, together with the findings about the warmth and affection of the fathers of highly masculine boys, may be interpreted as supportive of the role theory of identification.

4. The highly masculine boys appear to experience more permissive, easygoing familial climate and less punitive, more love-oriented techniques of discipline than their less masculine peers.

5. Boys high in masculinity tend to be high in conscience development, too. The correlates of these two products of parental identification are quite different, however.

References

1. Brim, O. G., Jr. Family structure and sex role learning by children: a further analysis of Helen Koch's data. *Sociometry*, 1958, 21, 1-16.

2. Bronfenbrenner, U. The study of identification through interpersonal perception. In R. Tagiuri & L. Petrullo (Eds.), *Person perception and interpersonal behavior*. Stanford Univer. Press, 1958. Pp. 110-130.

3. Brown, D. G. Sex role preference in young children. *Psychol. Monogr.*, 1956, 70, No. 14 (Whole No. 421).

4. Cava, E. L., & Raush, H. L. Identification and the adolescent boy's perception of his father. *J. abnorm. soc. Psychol.*, 1952, 47, 855-856.

5. Cottrell, L. S., Jr. The analysis of situational fields in social psychology. *Amer. sociol. Rev.*, 1942, 7, 370-383.

6. Freud, Anna. *The ego and the mechanisms of defense.* London: Hogarth Press, 1937.

7. Freud, S. The passing of the Oedipus-complex. In *Collected papers,* Vol. II. London: Hogarth Press, 1933. Pp. 269-282.

8. Freud, S. *The problem of anxiety.* New York: Norton, 1936.

9. Freud, S. *Group psychology and the analysis of the ego.* London: Hogarth Press, 1949.

10. Levin, H., & Sears, R. R. Identification with parents as a determinant of doll play aggression. *Child Develpm.*, 1956, 27, 135-153.

11. Mann, H. B., & Whitney, D. R. On a test of whether one of two random variables is stochastically larger than the other. *Ann. math. Statist.*, 1947, 18, 50-60.

12. Mowrer, O. H. *Learning theory and personality dynamics.* New York: Ronald, 1950.

13. Mussen, P., & Distler, L. Masculinity, identification, and father-son relationships. *J. abnorm. soc. Psychol.*, 1959, 59, 350-356.

14. Parsons, T. Family structure and the socialization of the child. In T. Parsons & R. F. Bales, *Family, socialization, and interaction process.* Glencoe, Ill.: Free Press, 1955. Pp. 35-131.

15. Payne, D. E., & Mussen, P. H. Parent-child relationships and father identification among adolescent boys. *J. abnorm. soc. Psychol.*, 1956, 52, 358-362.

16. Richards, T. W., & Simons, Marjorie. Fels Child Behavior Scale. *Genet. Psychol. Monogr.*, 1941, 24, 259-309.

17. Sanford, N. The dynamics of identification. *Psychol. Rev.*, 1955, 62, 106-117.

18. Sears, Pauline. Child-rearing factors related to playing of sex-typed roles. *Amer. Psychologist,* 1953, 8, 431. (Abstract)

19. Sears, R. R. A theoretical framework for personality and social behavior. *Amer. Psychologist,* 1951, 6, 476-482.

20. Sears, R. R., Maccoby, Eleanor E., & Levin, H. *Patterns of child rearing.* Evanston, Ill.: Row, Peterson, 1957.

21. Sears, R. R., Pintler, M. H., & Sears, Pauline. Effect of father separation on preschool children's doll play aggression. *Child Develpm.*, 1946, 17, 219-243.

22. Sears, R. R., Whiting, J. W. M., Nowles, V., & Sears, Pauline. Some child-rearing antecedents of aggression and dependency in young children. *Genet. Psychol. Monogr.*, 1953, 47, 135-234.

23. Siegel, S. *Nonparametric statistics.* New York: McGraw-Hill, 1956.

24. Sopchak, A. Parental "identification" and "tendency toward disorders" as measured by the MMPI. *J. abnorm. soc. Psychol.*, 1952, 47, 159-165.

ANXIETY AND VERBAL CONDITIONING IN CHILDREN

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Recent experimental literature has begun to stress applications of a model in learning theory which seems to have important implications for the study of interpersonal situations. These studies generally carry the label "operant conditioning" and are applying the well known Skinnerian learning theory to a study of verbal behavior. In the general model the dependent variable is the subjects' verbal behavior, with the independent variables being the rate and nature of reinforcements administered by the experimenter. If, as a result of reinforcement, there is a change in the verbal behavior of the subject, then conditioning is said to have occurred. An excellent review by Krasner (9) gives the most recent findings of these investigations with adults.

With the exception of the significant contributions of Estes (4) and Gewirtz and Baer (6) little work has been done to test the effectiveness of *social* reinforcement in children.

The present paper deals with one variable, anxiety, which seemed likely to influence verbal conditioning in the child. It was assumed that high levels of anxiety would impair the acquisition of complex verbal responses. Extrapolating from Hull (7, p. 40), we might assume that at high levels of anxiety all existing habit tendencies are affected in a multiplicative fashion. One interpretation of this characteristic, made by the Iowa group [Farber (5), Taylor (15), and Jessor (8)] has been that high levels of anxiety will interfere with the acquisition of a complex response.

Two estimates of anxiety were used. The first estimate consisted of clinical judgments of manifest anxiety made by judges who observed the child's reaction to the experimental situation. Continuous measures of skin conductance was used as a second criterion [Duffy (2), Wilcott (16)].

Two groups of 20 disturbed children were exposed to a laboratory situation in which it was possible to obtain a response-inferred, clinical estimate of anxiety. An initial study with the first sample was carried out by the senior author. The results of this investigation were significant enough to merit cross validation. During this latter part of the study a second experimenter[2] was also added to check on the consistency of the clinical obser-

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[1] The writer wishes to thank Dr. R. A. Littman for his critical assistance in preparing this manuscript.

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vations being made. The response being conditioned in this situation was a response commonly made by children to the Kent-Rosanoff word association list. Each time the child gave a verb response the experimenter responded with a phrase such as, "That's fine." These phrases constitute the reinforcing stimulus. A change in response rates from nonreinforced to reinforced trials would be evidence for "conditioning" in this case.

Subjects

The two groups of children were obtained from the Children's Division of the Nebraska Psychiatric Institute. These children were participating in either an in-patient, day patient, or out-patient program, depending on the degree of disturbance. Seven of the children were diagnosed as schizophrenic; for 20 of them the major problem was that of destructive or highly aggressive behavior; six were neurotic in the limited sense in which this term applies to children; four were mild behavior problems; and three children had neurological impairments. The children in the two groups were paired for age and sex; the mean chronological age for the first sample was 11.2 years and for the second, 11.8 years. In general, the second sample had fewer schizophrenic children (two in sample 2, five in sample 1), and more of the extremely aggressive and the mild behavior problems (15 in sample 2, nine in sample 1).

Measures

Word Association Task

In Woodrow and Lowell's (17) extensive research with children, using a modification of the Kent-Rosanoff word association list, the most frequent response class was verb responses. Twenty stimulus words were taken from this list, all of which had a high probability of eliciting verb responses. On *a priori* grounds 20 words that seemed equally likely to elicit verb responses were added. In order to reduce the likelihood of a subject's forming a response set, 20 additional words were introduced at intervals in the list. These 20 words, taken from the Woodrow and Lowell publication, had a high probability of obtaining "opposite" responses.

The total list of 60 words was used in a pilot study with 10 disturbed children. On the basis of these data the words were divided into two lists, each having an equal likelihood of obtaining verb responses.

In the experiment the examiner first described the task and then presented three examples. One of these examples consisted of a verb response. In administering the first list, the responses made by the child were recorded without any comment by the examiner. In the second list each time the child made a verb response the examiner made an appropriate reinforcement such as, "You're doing fine," or "Say, that's good, I'll bet you've done this before." These and other similar comments were made as enthusiastically as possible to maximize their reinforcing value. For both samples

the word list to be reinforced was alternated in such a fashion that both lists were reinforced an equal number of trials.

The difference in frequency of verb responses between the reinforced and nonreinforced word lists constitutes the change in response emission that was our criterion of "conditioning."

Using verbal material with adults in similar experimental procedures, it has been noted that frequently the subjects become aware of the principle determining the reinforcing event and display an appreciable increment in response (9). When questioned, the subjects in this experiment indicated that they had noticed the examiner praised them at certain times, but claimed they had not formed any hypothesis as to these reinforcements following certain response classes.

Assessment of Anxiety

Clinical work with disturbed children indicated that a routine physiological examination in the laboratory was an anxiety-arousing experience. To hold the effect of food intake and general activity level constant, the children were brought into the physiological laboratory at only two time-intervals during the day. After being shown the complicated electronic equipment, the child was taken into a dimly lit room and asked to lie down while electrodes were taped to his forearms and palms. With some exceptions the procedure elicited responses indicating the presence of manifest anxiety. From remarks made during, or after, the experiment the cues arousing the anxious responses were variously identified by the children as the unfamiliarity of the staff, the presence of the electronic equipment, the electrodes, or the general science fiction atmosphere. Many of the children verbalized their fear of being shocked.

Following a five-minute quiet period, the child was interviewed by a clinical psychologist. Three general topics were covered in the interview: the child's feelings about being in the room, previous experience in a hospital setting, and a brief reassuring explanation as to the nature of the experiment. The observations made during this period were directed toward responses, both motor and verbal, which indicated the presence of manifest anxiety. The situational anxiety was rated along a nine-point rating scale; the correlation between independent ratings by two clinical observers in the second sample was .70.

Physiological Measure

The electrical resistance of the skin was recorded from the two sides of the body simultaneously with a Darrow type Wheatstone bridge feeding into the power amplifier of an Offner EEG machine. The electrodes consisted of ½ inch zinc plates, mounted with rubber pads, and coated with betonite-zinc sulfate paste placed on the upper arm and palms on both sides of the body. The small electrodes were used to allow for an electrode arrangement that could be securely taped to skin. Despite the small size of the electrodes and the taping procedure, there was still considerable

movement artifact. It was found, however, that with most subjects the movement artifact was considerably less for the left hand; consequently the skin resistance measurements from this side were used in the present analysis. Five measurements were taken from each five-minute interval to give a mean estimate of skin resistance during that period. In keeping with a suggestion by Lacey (10), these measurements were converted into skin conductance units to normalize the distribution.

Procedure

The experiment was divided into four sequences of five minutes each. Phase one consisted of a quiet period in which the child lay on the bed with the electrodes attached. One of two clinical psychologists was in the room with the child during this and all subsequent phases. During the second five-minute period one of the observers carried out the interview described above. Following this, the child was rated on manifest anxiety. The third phase was again a quiet period in which the child was instructed not to talk and to move about as little as possible. In the fourth period the observer who had interviewed the child administered the word association test. At the end of the period each child was briefly queried about his understanding of the examiner's praising him for some responses and not others.

In the first sample the senior author served as the only observer. In the second sample another observer was added.[2] In this second sample cases were alternately assigned to each observer and in such a way that each of the observers reinforced each of the word association lists an equal number of times.

Results

The increment in verb responses during reinforcement was significant at $p < .02$ for the first sample and $p < .12$ for the second sample. (These, and all subsequent t tests, are two-tailed.) This constitutes rather substantial evidence that learning actually occurred.

Recent investigations have pointed out that in the acquisition of *complex* responses high levels of drive may have an impairment effect. The complexity of the response hierarchy being reinforced is determined by the number of responses which are available for any given stimulus. Research with word association techniques (17) has shown that the number of response dispositions available for any given stimulus is so varied that it is reasonable to consider word association as a "complex" task. The hypothesis being investigated here is that high levels of anxiety are related to the alteration in emission of verb responses.

Comparing the reinforced with the nonreinforced trials, conditioning occurred if there was a significant increase in the frequency of verb responses during reinforcement. Table 1 presents the data showing the rela-

TABLE 1

CORRELATION BETWEEN REINFORCEMENT EFFECT AND JUDGMENT OF ANXIETY

	N	*Reinforcement Effect vs. Clinical Ratings*
Sample 1	20	—.53*
Sample 2	20	—.46

* $p < .05$.

tionship between clinical judgments of manifest anxiety and rate of conditioning.

The results from the clinical ratings are significant and in keeping with the hypothesis being tested. That is, children rated as high manifest anxiety showed an actual *drop* (both samples) in emission of verb responses while the low-anxious children showed a high rate of conditioning. The children showing a drop in verb responses during reinforcement pose an interesting problem. The same type of counterconditioning has been noted by Nuthman (11) and Ekman (3) in their work with adults. Ekman, for example, speculates that the phenomenon might be related to personality variables such as rigidity or negativism.

As the relationship between measures of skin conductance and conditioning tended to be curvilinear, epsilon (12) was used as an unbiased estimate of covariance.

Children who fell at *either* extreme along the anxiety continuum as measured by skin conductance showed little conditioning. In fact, children who measured very high or very low in skin conductance tended to show a drop in the number of verbs produced. Although the trends are similar for both samples, the relationship is significant only for sample 1 (Table 2).

TABLE 2

CORRELATION BETWEEN REINFORCEMENT EFFECT AND SKIN CONDUCTANCE

	N	*Reinforcement Effect vs. Skin Conductance*
Sample 1	20	—.48*
Sample 2	20	—.34

* $p < .05$.

It may be of some interest to note that the relationship between the two measures of anxiety was .26 (significant at $p < .11$).

In spite of the fact that there is a relationship between the increment in response rate and anxiety, this relationship is far from perfect and indicates the presence of other variables. For example, we might postulate that some children could be very tense and yet be highly efficient in learning a verbal response. This implies, and the clinical literature would certainly be in agreement, that taking into account the way in which a child handles his tension might have some relevance to the efficiency with which he learns. The present study was not originally designed to test this assumption but some of the data are relevant.

During the experiment each child had been rated on the frequency of verbal and motor responses. The reliability of these ratings (between judges) was .91. It was postulated that the child who had developed adequate controls for handling his tension would show a greater increment in learning than the child who is tense but expressed it motorically. To test this, all subjects were selected who measured above the median on skin conductance in the two samples. Skin conductance was used as an estimate of tension because the ratings of manifest anxiety and behavioral activity were probably not independent. This sample of children with high autonomic activity was broken down into two groups. Group one consisted of children showing little behavioral activity and group two showed frequent activity. The tense (high skin conductance) child who inhibited his motor activity showed four times the rate of conditioning as the tense child who expressed his tension in motor activity. Motor activity by itself was not related to the increment in response rate for the total samples. These findings should be interpreted with a good deal of caution as there were only eight children in each group ($p < .18$).

Discussion

There would seem to be reasonable evidence that clinical ratings of manifest anxiety relate to changes in a child's verbal responses. It should be kept in mind that these are extremely anxious children and that less extreme points on the anxiety continuum might show a different relationship to response acquisition. Essentially the evidence supports the contentions of the Iowa group as to the effect of anxiety on the acquisition of complex responses. This same model would predict that conditioning which involved a more limited set of alternatives would actually be facilitated by conditions of anxiety. Results obtained by Sarason (13) and Taffel (14) involving the conditioning of a response from a more limited set of alternatives show a positive relationship existing between anxiety and rate of conditioning.

The secondary finding would imply that for some children the model that assumes a linear relationship between anxiety and the acquisition of

a complex response is not adequate. Future investigations on this type of problem should perhaps take into account a possible interaction between anxiety, types of defenses, and the learned response.

One very meaningful development in the area of verbal conditioning is the investigation of differences in experimenters as to their reinforcing value. Binder, McConnell, and Sjoholm (1) found a significant relationship between experimenter characteristics and rate of conditioning. It would seem relevant to expand this kind of research and examine the parent and child in a laboratory situation to determine what aspects of the parents' behavior is reinforcing to the child. Within certain families does one parent have greater reinforcing value as it affects the child's verbal or motor behavior? If this were the case, and it seems likely, then we might predict that the parent who has the greater reinforcing value would be the one whose system of values, attitudes, and self-concepts the child might adopt. At the present time the writer is embarking on such a series of investigations.

There is an additional aspect of this research which relates meaningfully to the kind of learning situation a parent provides the child. In his review Krasner (9) reports that most of the subjects seem to be "unaware" of any learning having taken place even though there are significant changes in their responses. Although there are some complex experimental problems involved in estimating the subject's awareness, or lack of it, it would seem at this point that most of the *Ss* cannot verbalize the relationship between any specific response they make and a reinforcement by the experimenter. Nor are the subjects aware of any correspondence between reinforcements and changes in their own behavior. In many respects it is analogous to the learning experience of the child. The child is probably unaware of any but the most dramatic incidents of reinforcement or punishment invoked by his behavior. It is also doubtful that he would be aware of any attempts on his part to change his behavior to maximize some of the subtle reinforcements given by his parents.

Summary

Two samples of disturbed children matched for age and sex were subjected to a verbal conditioning experiment. Conditioning occurred if as a result of reinforcement by the experimenter there was a change in the frequency of verb responses on an adaptation of the Kent-Rosanoff word association list. The results indicate that conditioning occurred in both samples.

Two criteria were used to estimate anxiety. Both the clinical judgments of anxiety made in the situation and continous measures of skin conductance related in the expected direction to the rate of conditioning that took place. Children who were extremely anxious showed less "learning." Some of the implications of these findings for research in parent-child interaction were outlined.

References

1. Binder, A., McConnell, D., & Sjoholm, N. Verbal conditioning as a function of experimenter characteristics. *J. abnorm. soc. Psychol.*, 1957, 55, 309-314.
2. Duffy, E. The concept of energy mobilization. *Psychol. Rev.*, 1951, 58, 30-40.
3. Ekman, P. A. A comparison of verbal and non-verbal behavior as reinforcing stimuli of opinion responses. Unpublished doctoral dissertation, Adelphi College, 1958.
4. Estes, K. W. Some aspects of reinforcement upon verbal behavior of children. Unpublished doctoral dissertation, Univer. of Minnesota, 1945.
5. Farber, I. E. Anxiety as a drive state. In *Nebraska symposium on motivation*. Univer. of Nebraska Press, 1954. Pp. 1-46.
6. Gewirtz, J. L., & Baer, D. M. The effect of brief social deprivation on behavior for a social reinforcer. *J. abnorm. soc. Psychol.*, 1958, 56, 49-56.
7. Hull, C. L. *Essentials of behavior*. New Haven: Yale Univer. Press, 1951.
8. Jessor, R., & Hammond, K. Construct validity and the Taylor anxiety scale. *Psychol. Bull.*, 1957, 54, 161-170.
9. Krasner, L. Studies of the conditioning of verbal behavior. *Psychol. Bull.*, 1958, 55, 148-170.
10. Lacey, O. L., & Siegel, P. S. An analysis of the unit of measurement of the galvanic skin response. *J. exp. Psychol.*, 1949, 39, 122-127.
11. Nuthman, Ann. Conditioning of a response class on a personality test. *J. abnorm. soc. Psychol.*, 1957, 54, 19-24.
12. Peters, C. C., & Van Voorhis, W. R. *Statistical procedures and their mathematical bases*. New York: McGraw-Hill, 1940.
13. Sarason, I. G. Interrelations among individual difference variable, behavior in psychotherapy, and verbal conditioning. Paper read at Western Psychol. Ass., Eugene, Oregon, May, 1957.
14. Taffel, C. Anxiety and the conditioning of verbal behavior. *J. abnorm. soc. Psychol.*, 1955, 51, 496-501.
15. Taylor, Janet A. Drive theory and manifest anxiety. *Psychol. Bull.*, 1956, 53, 303-328.
16. Wilcott, R. G. Measurement of bodily excitation level as a correlate of anxiety: a theoretical approach. Paper read at Amer. Psychiat. Ass. Conference on Physiology of Emotion, Oklahoma City, 1957.
17. Woodrow, H., & Lowell, F. Children's association frequency tables. *Psychol. Monogr.*, 1916, 22, 1-109.

PSYCHOLOGICAL CONCOMITANTS OF AMPUTATION IN CHILDREN[1]

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Most studies reported in the literature of orthopedically disabled children have been based upon heterogeneous groups and often treated as if they were unitary. In a single study of the orthopedically handicapped may be found poliomyelitis, scoliosis, osteomyelitis, cerebral palsy, amputation, and other cases. While for many purposes conceptualizing these varied disabilities under one heading is justifiable, sometimes the characteristics and consequences of a particular disability are neglected. This may be because of our emphasis upon the generality of the psychological effects of disability and a reluctance to impart specificity to the concomitants of individual type handicaps. For these reasons, and because in the past large numbers of child amputees have been unavailable for psychological study, there have not been any reports concerned solely with amputee children.

Isolation of amputee children for special study is desirable for many reasons. Most important is that for the first time there is an organized national attempt to improve the prosthetic situation of the amputee child. Psychological insights which could help in the construction, design, prescription, and training in the use of prostheses would be of immediate value. In addition, data relevant to important theoretical problems as the development of body image, castration feelings, and dependency feelings may be elicited, as well as indications for the practical management of these children and their parents.

Partially because of this lack of data, the Prosthetic Devices Studies of New York University, in cooperation with the Mary Free Bed Hospital at Grand Rapids, Michigan, did two clinical surveys of amputee children. Two reports published by New York University on the pros-

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[1] This is an extension of a paper presented at the 1958 meeting of the Eastern Psychological Association.

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thetic, biomechanical, and psychological factors in childhood amputation resulted.[2] The psychological section of the upper extremity report was by Ventur (4), and that on lower extremity amputee children by Siller (3). The purpose of this paper is to present and to analyze information obtained from these psychological studies, as well as from children seen since then for study at New York University.

Methodology

Subjects

The *S*s were 27 upper extremity and 25 lower extremity child amputees of both sexes and of congenital and traumatic etiologies. The ages were from 2.5 to 17 years, with almost every type of unilateral and bilateral amputation represented. There was a predominance of below-elbow amputations in the upper extremity cases and uncomplicated below-knee and above-knee cases among the lower extremity amputees. In addition, there were six bilateral lower extremity cases. Ten of the children—nine of whom were congenital amputees—had other anomalies besides the limb loss, such as speech or hearing defects, facial disfigurement, or claw hands, which served to confound the somatopsychological effects of amputation. The children were primarily of lower middle and lower class socioeconomic status. Few were then hospitalized, most being outpatients brought in especially for the survey.

Procedures

Each child, and in almost every instance one or both parents, was seen by either the writer or another psychologist for a semistructured clinical interview. The analyses to follow are based primarily upon this phase.

Supplementary information was derived by at least some of the following tests: a variation of the Draw-A-Person test, the Blacky, selected cards of the TAT, part of the Bachrach Modification of the TAT for handicapped children, the Mental Health Analysis Test, and a sentence completion questionnaire on parental attitudes designed at the Prosthetic Devices Studies.

An average of approximately two and one-half hours was spent with each subject and his parents.

Treatment of Data

A case report was prepared for each child from which all further analyses were made. These were then scrutinized for four areas of

[2] I would like to acknowledge the contributions of Dr. Sidney Fishman, under whose supervision both studies were conducted, and Mr. Pierre A. Ventur, who saw many of the children and prepared extensive case records from which further analyses were made.

psychological interest considered especially relevant to central problems of amputation: (a) Reactions to Disability, (b) Parental Acceptance, (c) Social Sensitivity, and (d) General Adjustment. Each subject was rated for the latter three constructs along a five-point scale as indicated below. Definitions of each follow:

1. *Reactions to Disability* comprises those behavioral patterns believed to be causally related to the amputation. It describes the specific psychological processes typifying the subject's response to his disability.

2. *Parental Acceptance* indicates the extent to which parent-child relationships are marked by warmth, love, and realistic concern. The rating scale ranges from "high acceptance" to "low acceptance" and included "above-average," "average," and "below-average" acceptance.

3. *Social Sensitivity* may be defined as the feeling of self-consciousness experienced by the amputee and his subjective appraisal of the effect of his physique on others. The rating scale ranges from "high sensitivity" to "low sensitivity" through intervening steps of "above-average," "average," and "below-average" sensitivity.

4. *General Adjustment* is a holistic concept covering the general effectiveness of the amputee's personality in relating to personal, situational, and social aspects of the environment. The scale extends from "superior adjustment" to "disturbed" (denoting serious maladjustment) and passes through "good," "adequate," and "inadequate" adjustment.

The Parental Acceptance, Social Sensitivity, and General Adjustment variables were later dichotomized for convenience in comparisons.

Subjectivity was partially reduced by having the case reports independently rated by two other psychologists experienced in working with amputees.[3] For the most part there was good agreement, and differences were resolved by reassessing the data. The prevailing tendency was to rate conservatively and to use the middle category freely.

Results

The findings for each variable alone will be presented, followed by the interrelationships between variables. Table 1 serves as an over-all summary of the findings.

Reactions to Disability

The principal defense mechanisms and behavioral patterns which reflect specific reactions to disability and amputation were itemized. They cover a wide area of psychological functioning, from observations of behavior to inferences about unconscious feelings and motivation. In this preliminary survey no effort was made to stabilize the level of observation or interpretation.

[3] Mr. Pierre A. Ventur and Dr. Samuel A. Weiss.

TABLE 1

SUMMARY OF PSYCHOLOGICAL CONCOMITANTS OF AMPUTATION IN CHILDREN

	Reactions to Disability	*General Adjustment*	*Parental Acceptance*	*Social Sensitivity*	*Amputation Etiology*
Reactions to Disability	*Most Frequent* — *N* Denial ..... 17 Compensation .. 17 Independence .. 15 Withdrawal .... 11 Inferiority ..... 11 Dependence .... 8 Depression 7				
General Adjustment ..	Adequately adjusted had more restitutive, less avoidant, and as many expressions of insecurity as the inadequately adjusted.	*N* — % Superior .... 5 — 10 Good ..... 6 — 12 Adequate ... 19 — 38 Inadequate .. 16 — 32 Disturbed ... 4 — 8			
Parental Acceptance ...	Same as General Adjustment and Reactions to Disability.	No significant relationship, but possibility of a trend. $p > .05$	*N* — % High ..... 5 — 10 Above Average 10 — 21 Average .... 15 — 31 Below Average 13 — 27 Low ..... 5 — 10		
Social Sensitivity	The relatively insensitive had more restitutive, fewer expressions of insecurity, and as many evident reactions as the highly sensitive.	Inadequately adjusted more sensitive. $p < .02$	No significant relationship, but possibility of a trend. $p > .05$	*N* — % High ..... 9 — 19 Above Average 11 — 23 Average .... 14 — 29 Below Average 10 — 21 Low ..... 4 — 8	
Amputation Etiology	No over-all differences. Traumatic group had more feelings of inferiority (8 to 3) and more depressive reactions (6 to 1).	Congenitals better adjusted. All 11 subjects with "good" or "superior" adjustments were congenital amputees.	No difference between amputees of congenital and traumatic origin.	No difference between amputees of congenital and traumatic origin.	*N* — *Mdn. Age* Traumatic .. 18 — 12.5 Congenital .. 34 — 8

The most frequent reactions are listed in Table 1. Actual denial of amputation was noted in only three children. In two cases of congenital origin, ages 5 and 6, the denial is complete and contemporary. The third child, now age 13, was a traumatic case at age 7 and manifested the complete denial for only the first week following amputation. Twenty-two other reactions, such as self-assertion, extroversion, shyness, repression, sublimation, and shame were also noted, none occurring more than four times.

Compensatory mechanisms and independence strivings were itemized only in those instances where they appeared to play a prominent role in the subject's functioning. Actually, they were so common that they might be considered characteristic of the group. It is apparent that compensatory devices and strivings for independence are very important and common techniques used by this group of handicapped children to reconstitute their feelings of self-esteem and sense of personal worthiness. That this is necessary is clearly indicated by the large number of self-rejective and inferiority-shame reactions.

General Adjustment

Sixty per cent of the children were rated as having either adequate, good, or superior adjustment. The remaining 40 per cent had ratings of disturbed or inadequate adjustment.

Absence of an objective criterion of adjustment limits the degree to which these data may be generalized; however, it is apparent that the proportion of inadequately adjusted to adequately adjusted is undesirably high. The 40 per cent inadequately adjusted figure is close to that generally reported for other orthopedically disabled groups (1).

Parental Acceptance

Sixty-two per cent of the children appear to come from homes with average or better parental acceptance. Qualitatively it was observed that despite evidence of rejection, guilt, and overprotection in a sizeable minority of the parents, the majority give indication of being able to accept their child on a relatively sound and wholesome basis. An outstanding characteristic of the parent group was feelings of impotence: "What can I do for my child?" It was our impression that, the more competent the parent felt to handle the problems offered by a handicapped child, the greater was the potential for a healthy parent-child relationship.

In assigning ratings, it was found that overprotection was better used as a sign of high acceptance than of low acceptance, regardless of the dynamic basis for the phenomenon.

Social Sensitivity

Forty-two per cent of the children were of either above-average or high social sensitivity. Although it is difficult to pinpoint what is meant by "average" social sensitivity, it is readily apparent that this group was sensitive

to social appraisal of themselves or of their injury. Three of the four children rated as low in sensitivity were under 6 years of age. When the subjects were dichotomized as above or below 8 years of age, the younger group was clearly less sensitive. While this finding is expected for developmental reasons, it is also clear that considerable sensitivity is not uncommon in younger children.

There were no significant differences in sensitivity between the upper and lower extremity children, although one might expect the former to be more affected in this respect. The presence of other anomalies in the lower extremity group and the much smaller number of such cases in the upper extremity group may account for these findings.

Relationship between Amputation Etiology and Other Variables

The median age of the 34 congenital children was 8 and that of the 18 traumatic amputees 12.5, which may influence comparisons. Only three of the 18 amputees of traumatic origin were below 11 years of age, while 24 of the 34 congenital amputees were. Another limiting factor was that some have almost always been disabled, while others are recent amputees, e.g., seven of the traumatic cases had suffered their amputation at age 3 or younger.

The traumatic group, despite being less than half the size of the congenital group, showed more feelings of inferiority (8 to 3) and more depressive reactions (6 to 1). Both of these differences may readily be seen as being related to amputation etiology. The psychological mechanisms operative here may be presumed to involve impairment of a previously unimpaired function, loss of sense of security, revival of dependency feelings, and realization of the imminence and possibility of death. Congenital amputees are less likely to mourn for that which they have never had. In many instances the congenitals' reaction would involve denial of handicap or idealization of the absent part. Traumatic amputees must, however, recognize that they are no longer just "anybody" but instead physically handicapped persons. It is likely that they carry the majority group's attitude of negative feelings toward the disabled with them into disability. Greater depression and more inferiority reactions in the traumatic cases can then be seen as being related to self-hate and decreased status.

All eleven patients judged to have attained a good or superior adjustment were congenitals, indicating a better adjustment than the traumatic amputees in this sample.

This finding is in accord with the previous discussion of the effects of traumatic injury. Impaired function, changed appearance, reconstruction of the self-concept, and many other basic changes are present in the situation of the traumatic amputee which the amputee of congenital origin is spared. Ordinarily, then, it would not be expected that congenital amputees are faced with adjustive problems as ego-shattering as are traumatic amputees, and, apparently, this situation is reflected in the final "general adjust-

ment" differences. It might be hypothesized that personality development of the traumatic amputee is affected by a neurotic reaction involving anxiety and defense. The congenital amputee's personality development more frequently will be less dominated by anxiety and better understood in terms of basic character development.

There were no substantial differences between the traumatic and congenital groups in terms of parental acceptance, although a trend might exist toward greater acceptance of the congenital children. Overprotection, which was treated as indicative of acceptance despite the possibility of being psychodynamically founded in guilt and aversion, was somewhat more prevalent in the parents of congenital children.

No reportable differences were found between the groups on the variable of social sensitivity.

Relationship between Reactions to Disability and Other Variables

A review of the different reactions to disability suggests that many serve a similar psychological function. Thus, compensation and sublimation are both active attempts to gain self and social approval, while withdrawal and depression are flights from social commerce with a narrowing of one's psychological environment. Denial, repression, and rationalization may also be considered a unit as may independence, assertion, and determination.

There would seem to be merit in categorizing the specific reactions in terms of their common function. The following classification is based upon the subject's primary mode of responding to his life situation as a result of amputation.

Most of the reactions to disability may be concerned with: (a) restitution of loss, (b) avoidance of the implications of loss.

There are some reactions, tentatively considered to be expressions of insecurity, which do not fit into this restitution-avoidance dichotomy. Further breakdown within these categories may eventually be possible, e.g., passive avoidance and active avoidance.

Restitutive reactions include: compensation, independence, sublimation, assertion, substitution, determination, and extroversion.

Avoidance reactions include: denial, withdrawal, depression, repression, aggression, shyness, and reticence.

Insecurity reactions include: inferiority feelings, shame, fearfulness, and dependency.

Each reaction was placed into one of the three categories before any further analyses were made. There were 46 restitutive, 53 avoidance, and 27 insecurity reactions noted. The primary criterion for placement in the restitutive or avoidance categories is the purpose to be achieved by the reaction or mechanism. In cases of positive orientation (restitution), the individual is striving for goals likely to provide satisfactions in their own right. On the other hand, persons who are negatively oriented (avoidant) are working primarily for goals which will prevent or reduce anxiety and distress.

Insecurity expressions, however, are not independent of either of the two but can lead to either restitutive efforts or to avoidance behavior. For example, one child may react to feelings of inferiority induced by amputation by withdrawing from social contacts, while another may compensate by extreme extroversion and assertiveness.

Additional data and new populations can serve to develop the subtleties and to define the limitations of this formulation. The restitution-avoidance dichotomy will provide the basis for a number of later comparisons, and its significance and productiveness will be directly tested.

There were no clear differences between the congenital and the traumatic *Ss* when analysis was made in terms of the restitution-avoidance dichotomy.

The relatively insensitive group (those with average, below-average, or low sensitivity) was considerably more restitutive, much less insecure, and about as avoidant as the highly sensitive group. The totals are noted in Table 2. Qualitatively, the high sensitive group accounted for 15 out of the 17 depressive, shyness, and dependence reactions, even though there were fewer highly sensitive subjects.

TABLE 2

RELATIONSHIP BETWEEN RESTITUTION-AVOIDANCE DICHOTOMY AND OTHER VARIABLES (Entries are in percentages)

	Sensitivity		Acceptance		Adjustment	
Type of Reaction	*Low* ($N=28$)	*High* ($N=20$)	*Good* ($N=30$)	*Poor* ($N=18$)	*Adequate* ($N=30$)	*Inadequate* ($N=20$)
Restitutive ...	50	24	41	23	48	25
Avoidant	40	46	37	58	32	60
Insecure	10	30	22	20	20	15

The parentally accepted group (those with average or better parental acceptance) had proportionately many more restitutive, far fewer avoidant, and about the same number of insecurity reactions as those with low acceptance (*see* Table 2). The principal qualitative difference was that accepted children were considerably more self-assertive (4 to 0).

It was hypothesized that those individuals who have recourse to restitutive facilities, e.g., compensation and independence, derive some satisfaction from their self-defensive operations and, as a result, are less likely to be inadequately adjusted than are those who utilize avoidance techniques. By using primarily avoidance techniques, an individual may successfully evade many anxiety-provoking stimuli. However, this in itself does not eventuate in any positive achievements or gratifications. The individual who must restrict his interactive environment, inhibit his actions, and deny his emotions to circumvent anxiety most often lacks the energy and freedom

to achieve self-satisfying goals. In addition to a vacuum left by the lack of positive goal-directedness, there is futility; although one tries to avoid anxiety, it is exceedingly difficult to do so successfully. One may withdraw from interpersonal contacts, rationalize inferiorities, repress ego-shattering thoughts, and still be left with a residue of debilitating anxiety.

The hypothesis was confirmed, as the adequately adjusted had proportionately many more restitutive and far fewer avoidant responses. There was no difference in proportion or quality of insecurity reactions (*see* Table 2). Qualitatively, the adequately adjusted subjects had overwhelmingly more independence reactions (13 to 2), and manifested less aggression, depression, and withdrawal.

Further confirmation of the positive relationship between a restitutive orientation and adjustment was demonstrated when those with only restitutive reactions were compared to those manifesting only avoidance. (Expressions of insecurity were not considered.) All 12 children noted only for restitutive reactions had adequate, good, or superior adjustment ratings. Of the 18 with only avoidant reactions, 10 were rated as having inadequate, 3 disturbed, and just 5 adequate general adjustments.

It is clear that there are characteristically different patterns of reaction to disability when subjects are differentiated in terms of the restitution-avoidance dichotomy and compared on adjustment, parental acceptance, and social sensitivity. It is also noteworthy that the general trend of the findings is commensurate with theoretical expectations.

Relationship between Parental Acceptance and Other Variables

Parental acceptance in this sample has been found to be related to the child's reactions to disability but not to amputation etiology. Chi square analysis of dichotomized parental acceptance ratings with dichotomized social sensitivity and general adjustment ratings failed to reveal statistically significant relationships at the 5 per cent level. Inspection of the 2×2 tables leads us to suspect, however, that with a larger sample significant relationships in the theoretically expected direction would be indicated.

Relationship between Social Sensitivity and General Adjustment

The final comparison of variables indicates that those rated as inadequately adjusted were generally more sensitive socially than those rated as adequately adjusted. The chi square testing this relationship was significant beyond the .02 level.

Sex Differences

Each of the variables was analyzed for the presence of sex differences. No statistically significant differences were obtained on the adjustment, sensitivity, and parental acceptance scales, although a trend exists for the 23 girls to be better adjusted and less sensitive than the 29 boys. The boys had more insecurity reactions (21 to 7) and approximately an equal number of

restitution and avoidance responses. There were 16 dependence and inferiority reactions among the boys as compared to only three such reactions among the girls. These findings are confounded by other variables such as etiology and age, which make interpretation difficult.

Discussion

Some of the more general findings can be summarized as indicating this group of amputee children (a) to be highly sensitive to social appraisal of themselves or of their injury, (b) to have an undesirably high proportion of inadequate adjustment, and (c) to have low parental acceptance. Conversely, it may be observed that for each of these variables the majority of the children do receive positive ratings. It is likely that these figures, aside from the social sensitivity scale, would not be unlike those obtained from the study of nonphysically disabled children and thus not directly attributable to influences of amputation.

Amputation influenced the behavior of these children in a way that is independent of the general rating scales. That is, while the children's reactions are not unique to amputees, their particular manifestations are best understood when the fact that they are amputees is considered. Thus, it was stated earlier that overprotection was better used as a sign of high parental acceptance than of low acceptance, regardless of the psychodynamic basis. This appears less incongruous if it is recognized that one of the more maladaptive results of overprotection is that it leaves the child less able to cope with nonfamilial situations. One aspect of overprotection in the disabled is that often the need to cope with nonfamilial situations is delayed, and there is a general contraction of the child's interactive environment. Therefore, although overprotection of the disabled in the long run is probably detrimental, a certain quality of "security" may well result. The consequences of overprotection in the disabled must then be analyzed in terms different from that of the nondisabled.

Commonly observed behavior presumed to typify the nondisabled child was also frequent among the amputee children. All the mechanisms and reactions described, except denial of disability, have been reported in the child development literature. This sample was distinguished, however, in the more frequent presence and greater importance of mechanisms such as denial, compensation, and feelings of inferiority, all of which obviously are functions of amputation.

The concept of a restitution-avoidance dichotomy was advanced to relate the varied reactions and defense mechanisms manifested by the subjects to amputation. Some validation of the concept was demonstrated when it served to discriminate between subjects on other variables in a theoretically expected direction.

Although the restitution-avoidance dichotomy was conceived independently of any particular theoretical system, in most respects the restitutive

orientation is similar to Adler's concept of compensation. However, no adequate equivalent of the avoidance orientation exists, to our knowledge, in the Adlerian writings. Closest is the description of increased feelings of inferiority and consequent withdrawal. These mechanisms are relatively unemphasized and not awarded the conceptual stature given to compensatory efforts. Our experience with the disabled indicates that avoidance reactions occur too frequently and are too important not to be considered in their own right.

In addition to the more general theories, many studies have been concerned with the description of specific modes of adjustment to disability. A review of the types of adjustment generally reported (1, 2) shows that the restitution-avoidance dichotomy differs in its emphasis on the purpose of behavior rather than its description.

Because it is a teleological concept, it has greater "explanatory" and "predictive" value enabling the descriptive patterns of adjustment to be readily absorbed. For these reasons it is believed that the present proposal has particular meaning because it is based upon a very real and basic difference in value orientation.

Future use of the dichotomy must guard against "halo effects" which may influence the ratings. Closer specification of the constituents of each category also is necessary. Further work is to be directed toward the development of an objective-type inventory which may be used to obtain restitution, avoidance, and insecurity scores.

Summary

Three psychologists, using case studies, rated 52 child amputees on their reactions to disability, parental acceptance, social sensitivity, and general adjustment. The findings for each variable and the interrelationship between variables were presented.

Sixty per cent had adequate or better adjustment, 62 per cent had at least average parental acceptance, and 58 per cent no more than average sensitivity.

The most frequent reactions to disability were denial of handicap, compensatory efforts, independence strivings, withdrawal manifestations, feelings of inferiority, dependence, and depression.

The specific reactions to disability were categorized in terms of a teleological dichotomy which subsumed most as being concerned with restitution of the loss or avoidance of the loss. The empirical findings support the pragmatic fruitfulness and theoretical validity of the restitution-avoidance dichotomy.

References

1. Barker, R. G., Wright, Beatrice, A., Meyerson, L., & Gonick, Mollie R. Adjustment to physical handicap and illness: a survey

of the social psychology of physique and disability. (Rev. ed.) *Soc. Sci. Res. Council,* 1953, No. 55.

2. MEYERSON, L. (Ed.) *Journal of Social Issues,* 1948, 4, 4.
3. SILLER, J. Psychological evaluation. In S. Fishman (Ed.), *A survey of 24 lower extremity child amputees at the Mary Free Bed Hospital, Grand Rapids, Michigan.* New York Univer., Prosthetic Devices Studies, Report No. 115.21, 1957.
4. VENTUR, P. A. Psychological evaluation. In S. Fishman (Ed.), *A survey of 23 upper extremity child amputees at the Mary Free Bed Hospital, Grand Rapids, Michigan.* New York Univer., Prosthetic Devices Studies, Report No. 115.17, 1955.

A MOTHER-DAUGHTER COMPARISON ON SELECTED ASPECTS OF CHILD REARING IN A HIGH SOCIOECONOMIC GROUP

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The analysis of trends in child-rearing practices has been undertaken in several ways: guidance literature has been surveyed (4, 5, 7); successive generations have been questioned (3); and data gathered at different times have been compared (1).

In the first study to survey guidance literature Stendler (4) reviewed 60 years of advice given in several leading women's magazines and identified three different periods between 1890 and 1950. A "highly sentimental approach to child-rearing" was discerned in the 1890's and 1900's. This shifted to a "rigid, disciplinary approach" from 1910 through the 1930's, and finally the 1940's "emphasized the self-regulation and understanding of the child."

In an extensive survey of popular and professional literature Vincent (5) studied the controversy over breast vs. artificial feeding and also reported trends in infant disciplinary techniques for the same 60 years. While a preference for breast feeding existed throughout, there was a shift in the arguments given from physical health factors to emotional and psychological factors. With respect to infant care disciplines Vincent discovered that differences of opinion were to be found mainly at different periods in time with the writers shifting almost in unison. One of the most pervasive subjects in the literature dealt with feeding schedules for the infant. In 1890, 100 per cent of the articles in three women's magazines recommended a loose schedule; this gradually shifted so that, by 1920, 100 per cent of the articles in the same magazines were recommending a tight schedule; and the final period is characterized by a gradual shift to 100 per cent of the articles in 1948 recommending "self-regulation" conforming to the baby's needs.

Wolfenstein (7) analyzed the content of the several editions of the United States Children's Bureau bulletin *Infant Care* from 1914 to 1951. Briefly the main trends she found were as follows: In the period from 1914 to 1921

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there was very strong concern over autoerotic behavior and drastic measures were recommended for coping with this "danger." From 1929 to 1938 concern shifted to bowel training which was to be carried out as early and as quickly as possible. There was an emphasis on severe scheduling, and "the main danger which the baby presented at this time was that of dominating the parents." In 1942 to 1945 "the child became remarkably harmless, in effect devoid of sexual or dominating impulses." He was mainly concerned with exploration; autoeroticism no longer caused excitement; weaning and toilet training were to be started later and to be carried out gently. By 1951 the mildness continues but concern in some areas starts to reappear. Autoeroticism can be tolerated only by denying that it is autoeroticism, and the danger of the child's domination of the parents that was present in 1929 also returns as an area of concern.

The only study comparing the statements of two generations of mothers was that of Staples and Smith (3). They studied 87 grandmother-mother pairs and found that the grandmothers were more strict in all eight areas of child care for which scales had been developed.

Bronfenbrenner (1) surveyed child rearing studies over a 25-year period and, while most of the findings concern class differences, conclusions as to some trends are also possible. There has been a general shift in both middle and lower class mothers towards more permissiveness in feeding and weaning. Since World War II, middle and lower class mothers have reversed their position in permissiveness regarding toilet training with the middle class mother now being more permissive. (The data on toilet training, however, only allowed between-class comparisons over time and not within-class trends.) Increased permissiveness among middle-class mothers also extends to other areas such as dependency, sex, aggressiveness, and freedom of movement outside the home.

A unique opportunity to add data from a high socioeconomic level to this body of literature was afforded by the population in attendance in this college. Accordingly, a study was undertaken with a twofold purpose: (a) to investigate the relationships between how a young woman intends to raise her children and how she herself was raised, and (b) to compare the reported child-training practices of one generation with the professed intentions of the succeeding generation in upper-middle and lower-upper socioeconomic classes.

Method

Questionnaires

Items were constructed for the following areas: sucking and feeding, toilet training, dependency, aggression, sex and modesty, bedtime restrictions, and manners. The descriptive categories from the tables published by Sears *et al.* (2) were found to be useful in formulating the items. Accordingly, these authors were freely quoted in constructing our items and in reporting our tabulated results. A sample item is shown below:

SEVERITY OF WEANING*

Which of the following would best describe the weaning process with your child?
1. Weaned fairly abruptly, did not give in if the child wanted to suck.
2. Weaned fairly abruptly, but allowed occasional night bottles.
3. Weaned moderately abruptly, withheld some bottles in spite of protests, but allowed one night bottle.
4. Weaned gradually, but not allowed to return to sucking whenever she wished.
5. Weaned gradually, allowed to return to sucking whenever she wished.
6. Child weaned herself by eventually refusing breast or bottle.

* Mother's form.

Where feasible, the above mentioned areas were broken down in the following manner similar to the analysis of behavior made by Whiting and Child (6): items dealing with the degree of initial indulgence for the infantile behavior in that area, items dealing with the age of socialization out of infantile behaviors to more mature forms, and items dealing with the severity of the socialization in that area.

Two forms of the questionnaire were constructed, e.g., "What would you do . . ." on the daughters' form was changed to "What did you do . . ." on the mothers' form.

Subjects

The daughters in this study come almost entirely from upper-middle and lower-upper class homes. This classification as to socioeconomic level is made on the basis of an examination of parental occupation and the cost of attending Hollins College. Of the fathers in our sample 54 per cent were corporate executives or owners of large businesses, and 16 per cent were professional men. The basic fee alone here is $2300, and only 15 per cent of the students had any scholarship assistance in 1957-1958. Even for these students the total amount of assistance available was less than $1000 per student.

No information was available as to the socioeconomic status of their parents when these daughters were infants, but it is assumed that the majority of the sample would still fall within the same socioeconomic levels.

The daughters were obtained by randomly sampling 40 per cent of the eligible student population. The eligible population was obtained by eliminating psychology majors and students studying abroad at the time of the sampling. Replies were obtained from 135 of these or 67.5 per cent of the sample.

Questionnaires were sent to the mothers of these *S*s, and replies were received from 86 or 63.7 per cent of them.

Instructions

Letters were sent to both daughters and mothers explaining the importance of the research and requesting their honest and frank cooperation

in answering the questions. They were assured that all replies would be considered confidential.

In addition, a sheet of instructions was enclosed which included the following points: (a) They were instructed to check the alternative which best described the situation; there was room after each section for qualifications or comments. (b) The daughters were asked to answer with respect to how they felt and were requested not to discuss it with friends. (c) The mothers were asked to answer only with respect to their daughter who was also cooperating in the study; it was stressed that we were interested in what they *did* and not with what they *would do* now. (d) The daughters were asked to answer all questions only with respect to how they thought they would treat a daughter. (e) It was stressed that we were concerned only with the first five years of life. (f) It was finally pointed out that there were no right or wrong answers.

Results

Mother-Daughter Relationships

To ascertain if any relationships existed between the daughters' reported intentions and how they themselves were handled, chi squares were computed on the 86 mother-daughter pairs for each of the 34 items on the questionnaire. Only one item yielded a significant chi square ($p < .001$), that concerning punishment for disobedience; a positive contingency coefficient of .430 (3×3 table) was obtained indicating that daughters who were more often punished for disobedience intended to punish their own children more often for the same thing. This single significant relationship, however, could well be a chance finding.

The failure to find any other significant relationships certainly indicates that other variables are more important in determining the daughters' intentions and expectations than their own experiences in each area.

Comparison of Generations

The other major purpose of the study was to make a comparison of the responses of one generation with the responses of the next. Accordingly frequency tabulations were made for each item and all the daughters were compared with all the mothers by means of t tests. The results will be presented in summary form for each area of behavior.[1,2]

[1] A complete set of 34 tables has been deposited as Document number 6084 with the ADI Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. A copy may be secured by citing the Document number and by remitting $2.50 for photoprints, or $1.75 for 35 mm. microfilm. Advance payment is required. Make checks or money orders payable to: Chief, Photoduplication Service, Library of Congress.

[2] Due to the fact that the wording for many of our items was taken from tables in Sears *et al.* (2), it is possible to compare our results with theirs in many cases. But there are too many variables distinguishing our samples to warrant any conclusions from such a comparison.

Sucking and feeding. The daughters were much more willing to use a pacifier than the mothers ($p < .01$). Ninety-three per cent of the mothers said they never or hardly ever used anything of this sort whereas only 25 per cent of the daughters said they never intended to use one. The daughters intended to be more indulgent initially in that they leaned more towards demand feeding ($p < .001$). The average age for the beginning of weaning was about 9 months for both groups, but the daughters intended to be less severe both in having a significantly longer time before expecting completion (6.8 vs. 5.2 months from start to finish, $p < .01$) and being less severe in the actual process ($p < .05$).

Toilet training. The two groups did not differ in the length of the toilet training period, but the daughters intended to start later and end later. The average starting age in the mothers' reports was a little over 9 months while the daughters did not intend to start on the average until over 15.5 months ($p < .001$). And, while the mothers reported completion at a little over 18 months on the average, the daughters' average expected age for completion with their children was 23.5 months ($p < .001$). There was a slight difference in the severity of training which seems incongruous with the above results in that the daughter intended to be more severe. They intended to punish mistakes slightly more often ($p < .05$), and to use a slightly greater amount of pressure (nonsignificant).

Dependency. Included here were items dealing with such things as attitudes towards fondling, responsiveness to crying, amount of attention given the child, etc. There were few significant differences. Both groups were only moderately responsive to crying (the daughters slightly less than the mothers, but not significantly so) in that there was not much haste in picking the child up. Almost everyone agreed that "A baby and young child needs to be hugged, kissed, and fondled." Both were rather permissive in allowing the child to hang on to their skirts and follow them around, but the daughters did intend to spend a little more time in close contact with the child in addition to necessary care ($p < .05$). The daughters did not expect the child to dress herself until almost 4.5 years whereas the mothers reported this was accomplished on the average at 3.8 years ($p < .001$). Both expected the child to start helping around the house at about 6 years, but there were very wide differences here among respondents within each group. Finally, both groups were only moderately sympathetic with a child who came crying because other children were teasing.

Aggression. Neither group was permissive with respect to aggression directed toward parents, and both groups tended to punish this form of behavior. With respect to aggression towards other children, approximately 60 per cent of both groups would intervene and stop any fighting as soon as possible. Approximately 30 per cent of both groups would punish the child for this kind of behavior. Disobedience is another thing that was not tolerated by either group. Spanking or scolding for disobedience would occur quite frequently in approximately two-thirds of each group. Finally,

with respect to the handling of temper tantrums there was a significant difference between the groups ($p < .001$). The daughters tended more towards ignoring the behavior although there were wide differences within each group. Fifty-three per cent of the daughters would completely ignore the child right where she was whereas only 23 per cent of the mothers whose daughters had had tantrums ($N = 52$ out of the 78 answering the item) reported this reaction. Twenty-five per cent of the mothers reported spanking the child during the tantrum, and 27 per cent reported trying to talk her out of it. The daughters' percentages on these two items were 6 per cent and 16 per cent, respectively.

Sex and modesty. One of the most interesting findings in this area was the marked decrease in the percentage of mothers answering the items. On all of the other items of the questionnaire an average of 93 per cent of the mothers gave an answer, but on the items in this area an average of only 62 per cent of the mothers responded.

With respect to permissiveness towards immodesty about 90 per cent of those answering in both groups would dress a child immediately if she took off her clothes outdoors or in the presence of other children, and almost 30 per cent of both groups would punish this sort of behavior. The age at which the child would no longer be allowed to undress in the presence of others for bed, bath, etc., produced a significant difference between the groups: the daughters would begin modesty training at a little over 6 years of age on the average while the mothers began on the average a little over 4.5 years of age ($p < .001$). There were very large individual differences within each group here, however, with a range from "never" to over 8 years of age.

The daughters were slightly more permissive towards mild sex play such as taking baths with other children or going to the toilet with other children at 4 or 5 years of age ($p < .02$).

Neither group was permissive towards genital touching, and the daughters intended to punish this behavior more often ($p < .002$). This finding is inconsistent with the general trend for the daughters to be more permissive and is a reversal of the trend found in the guidance literature by Wolfenstein (7). (It is possible, however, that the mothers who refused to answer the items in this area were severe in the treatment of this sort of behavior.)

Bedtime restrictions. Both groups were fairly strict about bedtime, trying to keep it at about the same hour each night and rarely making exceptions for company, etc. Once the child was in bed, she would seldom be allowed to get up again.

Sending the child to bed as a means of punishment was indicated slightly more often by the daughters than the mothers ($p < .001$). Eighty-eight per cent of the mothers said they never or hardly ever did this, while only 63 per cent of the daughters so responded.

Manners. The average age for the beginning of the teaching of manners was 2.4 years for the mothers and 3.4 years for the daughters ($p <$

.001), but the daughters were more concerned with correcting a breach of manners and making the child perform the proper behavior ($p < .01$).

Discussion

We have studied the child-rearing attitudes and practices of both mothers and daughters in an upper-middle and lower-upper class sample. It should be kept in mind, however, that the mothers were questioned as to how they raised their daughters and the daughters were questioned as to how they intended to raise their own daughters. Hence, our findings are limited to female children, and general conclusions as to the handling of such things as aggression, for example, should be qualified. Answers might be quite different on some items had they been questioned concerning sons.

The failure to find more than one significant relationship between the mothers' responses and their daughters' responses is very interesting. How the daughters were treated has no direct bearing on how they intend to treat their own daughters. What then, has determined their attitudes and intentions? Is it possible that the mothers' *current* attitudes have an influence; another study would be necessary to answer this possibility. Courses in child psychology can probably be ruled out as influences since courses which dealt with the kind of child-rearing techniques covered by the questionnaire were not given at this college at the time of the study. The changing advice in the guidance literature (7) may have an effect, but it is doubtful that many girls of this age have been reading literature on child-rearing. The general conclusion is that there are many possible reasons for the lack of relationships, and this study produces no data as to what they might be.

There are no contradictions between this study and the studies by Wolfenstein (7), Stendler (4), or Bronfenbrenner (1) in which the general trend from the 1920's and 1930's to the present time is towards more permissiveness and self-regulation with less concern towards such things as autoeroticism (at least superficially).

The daughters in the present study are more indulgent initially and less severe in the socialization process in both the sucking and feeding area and the toilet training area. In the area of dependency there is little difference between the groups, but both are only moderately responsive to crying perhaps reflecting in this fashion the concern mentioned by Wolfenstein (7) over domination by the child.

Aggression is something that neither of these groups will permit. Part of this intolerance may be due to the fact that we are only dealing with female children, but the idea that you should respect your parents seems to make any form of aggression towards them completely intolerable.

In the area of sex and modesty it would be very interesting to find out just how those mothers who refused to answer did treat these problems. The taboos attached to sex in our society are undoubtedly involved here, and repressions or perceptual defenses with respect to behavior in this area could certainly be suspected.

Finally, the fact that the daughters would send their child to bed as a means of punishment significantly more often than the mothers is a surprising reversal of the general trend towards more permissiveness in the daughters.

Summary

There were two purposes to this study: (a) to investigate the relationships between how a young woman intends to raise her children and how she herself was raised, and (b) to compare the reported child-rearing practices of one generation with the professed intentions of the succeeding generation in a rather high socioeconomic class of people. Questions dealing with sucking and feeding, toilet training, dependency, aggression, sex and modesty, bedtime restrictions, and manners were answered by 135 daughters and 86 of their mothers. Where feasible, the above areas were broken down into items dealing with initial indulgence, age of socialization, and severity of socialization.

The only significant correlation between mothers and daughters was on an item dealing with punishment for disobedience. A number of significant differences were found between the two populations of responses, however. The daughters were both more indulgent initially and less severe in the socialization process in both sucking and feeding and toilet training. There was little difference in the area of dependency behavior. Both groups were intolerant of aggression. The daughters were somewhat less concerned with modesty and were more permissive towards mild sex play, but they intended to punish genital touching more often. Both were fairly strict about bedtime. The daughters would start teaching manners later, but they were more concerned with correcting a breach of manners.

References

1. Bronfenbrenner, U. Socialization and social class through time and space. In E. E. Maccoby, T. M. Newcomb, & E. L. Hartley (Eds.), *Readings in social psychology*. New York: Holt, 1958. Pp. 400-425.
2. Sears, R. R., Maccoby, Eleanor E., & Levin, H. *Patterns of child rearing*. Evanston, Ill.: Row, Peterson, 1957.
3. Staples, Ruth, & Smith, June W. Attitudes of grandmothers and mothers toward child rearing practices. *Child Develpm.*, 1954, 25, 91-97.
4. Stendler, Celia B. Sixty years of child training practices. *J. Pediat.*, 1950, 36, 121-134.
5. Vincent, C. E. Trends in infant care ideas. *Child Develpm.*, 1951, 22, 199-209.
6. Whiting, J. W. M., & Child, I. L. *Child training and personality: a cross-cultural study*. New Haven: Yale Univer. Press, 1953.
7. Wolfenstein, Martha. Trends in infant care. *Amer. J. Orthopsychiat.*, 1953, 23, 120-130.

POWER ASSERTION BY THE PARENT AND ITS IMPACT ON THE CHILD [1,2]

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Power is an ingredient of many social situations. If we consider power as the potential an individual has for compelling another person to act in ways contrary to his own desires, we can see that there are a variety of situations in which power exists. The parent-child relationship is one of these. The purpose of this paper is to analyze the effects of the use of power by the parent on the personality of the child. First, it is necessary to define the concept of power as it is here used.

The potential for compelling unmotivated behavior in another person is, aside from idiosyncratic personality factors, largely a function of how much control one is given over the administration of punishment and the allocation of supplies needed by the other person, as well as the amount of freedom permitted by the larger social unit to the exercise of control. (Examples of societal restraints are regulations delimiting the conditions and the manner in which power may be asserted, and the existence of agencies of appeal for low-power persons.) Power may be manifested overtly in a class of social behaviors called influence techniques, which are defined as on-the-spot attempts to modify another person's behavior.[3]

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[1] The data reported here are from a larger study entitled, "A Study of Parent Influence Techniques and Their Psychological Effects on the Child," initiated with a grant from the Social Research Foundation and continued with the aid of a grant from the Foundation's Fund for Research in Psychiatry. The larger study was planned and carried out by Drs. Irving Sigel, Albert Dreyer, and Irving Torgoff, in addition to the writer.

[2] A paper based on part of the material presented here was read at the 1958 American Psychological Association meetings.

[3] Viewing influence techniques as manifestations of power suggests that power structures may be conceptualized as social systems which are in equilibrium when concordance exists between the behavior of the low-power person and the wishes of the high-power person and which are in disequilibrium when there is discordance. Making the usual assumption about systems, that disequilibrium produces forces in the direction of equilibrium, influence techniques used by high-power persons can then be seen as behaviors functioning to achieve and maintain equilibrium within the system.

Child Develpm., 1960, 31, 129-143.

The kinds of influence techniques a person may reasonably use is determined in large part by his power position. Thus, in those areas of life where the power structure applies, the high-power person is able to choose between (a) techniques which assert his power, i.e., apply external pressure; and (b) techniques which attempt to gain "voluntary" behavior change by inducing internal forces. The low-power person, on the other hand, is more limited to the latter types of techniques. This difference in amount of choice applies to the initial techniques used to change the other's behavior and, perhaps even more so, to those used in reaction to noncompliance.

When the parent-child relationship is examined in this context, it is clear that the parent has a great deal of power in all areas of the child's life. The parent possesses and controls the material and emotional supplies needed by the child. As the controller of these supplies, and with his greater physical strength, he is in the position to punish the child at will, either physically or through deprivations. He can potentially force any behavior on the child, within the latter's biological and physical limitations, e.g., it is not possible to force a child directly to move his bowels or to fall asleep. Furthermore, the parent's treatment of the child—outside of extreme neglect and cruelty—is subject to little, if any, legal restraint. Probably in no other relationship does a person in our society have such complete power over another.

Because of his strong power position, the parent is free to choose influence techniques which, in varying degrees, assert power or attempt to induce the child to change his behavior voluntarily. The most power assertive techniques that might be used—as initial techniques or as reactions to noncompliance—are those which, without qualification, put direct coercive pressure on the child to change his entire ongoing pattern of behavior immediately. These techniques, exemplified by direct commands, threats, deprivations, and physical force, we refer to as *unqualified power assertion.*

The same techniques become less power assertive when qualified. One type of qualification is an explanation which attempts to justify or legitimize the required behavior change in terms of something outside the parent's control, e.g., the welfare of the child, the parent, or someone else; the physical, temporal, or spatial demands of the situation; or the socially prescribed norms of child behavior. Another type of qualification is some form of compensatory gratification for the child which permits him a certain amount of closure before requiring compliance or indicates that closure will be possible soon after compliance. Or the parent might temper the power assertiveness of a technique by providing a substitute, making the required behavior more attractive, or expressing supportive understanding of the child's desire to continue what he is doing.

Techniques, on the other hand, which do not assert power are those which invoke no parental authority but instead rely for their effectiveness primarily on the child's own internalized standards and good judgment. Such techniques communicate to the child the behavior change desired

but also, with varying degrees of explicitness, indicate that he has the choice of complying or not.[4,5]

Our concern here is with the parent's use of unqualified power assertion and its implications for the child's personality development.

Theory

Any influence technique the parent uses to modify the child's behavior in a direction not desired by the child is apt to communicate, explicitly or implicitly, some degree of dissatisfaction or displeasure with the child's ongoing behavior. The child cannot readily ignore such discrepancy of will between the parent and himself because of his low-power position in the home and his total dependence on the parent. It follows that any influence technique tends to interrupt the continuity of the child's behavior and thought processes and to present him with a conflict. The amount and type of conflict depends on the specific technique employed by the parent and the child's motivational state at that time.

Unqualified power assertive techniques convey that the parent feels strongly about the behavior at issue; that despite the child's wishes of the moment he must, without question, stop what he is doing and do what the parent wants of him. The parent does not attempt to explain nor to justify his demand, nor does he attempt to compensate the child for having to alter his behavior. In using these techniques, especially in reaction to the child's noncompliance, the parent appears to impose his personal will rather than legitimize the demand and to override the child's wishes and involvements of the moment.[6] Neither the child's wants nor his internalized controls are called upon to help change his behavior. Unqualified power assertion relies for its effectiveness primarily on the high degree of external coercive pressure it puts on the child to comply.

From the standpoint of the child the demand for unconditional surrender of his own interests and involvements in such an arbitrary manner not only frustrates his momentary need for task completion but also constitutes an assault on his autonomy as well. Opposition tendencies and feelings of hostility should therefore be aroused in response to the parent's

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[4] Techniques which do not assert power fall into two broad groupings: those which appeal to some aspect of the child's already existing motivational system, e.g., conscience, self-esteem needs, desire for physical comfort; and those which merely propose or suggest the behavior change wihout any further elaboration.

[5] A more complete and detailed presentation of the entire influence technique categorization, along with definitions and illustrations of the various subcategories, is available from the author on request.

[6] This is not to say that the parent's *goal* with respect to the child's behavior is necessarily arbitrary or based on whim. Indeed, it is our impression that the parent's goals usually arise out of the physical or social demands of the situation, even when unqualified power assertive techniques are used and, further, that the required behavior change is often in the child's long-range interest. All that is meant here is that the *technique itself* involves no explicit attempt to explain or to gratify the child's needs.

use of unqualified power assertion as an initial technique or as a reaction to the child's noncompliance, especially the latter. It follows from this brief analysis of the immediate impact of unqualified power assertion on the child that its frequent use by the parent, especially in reaction to the child's noncompliance (to be called "reactive unqualified power assertion"), should lead to the accumulation of hostile tension, needs to be power assertive toward others, and heightened autonomy needs—all of which may be displaced in more permissive situations. The development of a power-assertive orientation toward others may also be facilitated by the child's identification with the parent model, i.e., his introjection of the parent's power assertiveness.

In addition to the above, the use of unqualified power assertion gives the child no explicit information that may help him develop internalized controls or draw upon those that already exist. Because of the threatening and punitive aspects of unqualified power assertion, the main basis for controlling unacceptable impulses that may be learned is expediency and fear of the consequences of noncompliance, especially from authority figures. The child may also become sensitized to the power aspect of social relationships because the use of unqualified power assertion highlights the power structure existing in the home. Frequent experiences like these should result in the child's acting out of his hostile and other impulses more toward low-power than toward high-power persons. Whether or not these impulses are acted out toward high-power persons at all would depend on how permissive they are.

It should be emphasized that this theory pertains to the *excessive* use of unqualified power assertion. There are undoubtedly many situations in which these techniques may be quite appropriate, e.g., when there is external danger to the child with no time for explanations and when physical restraint is necessary in order to keep the child with inadequately developed controls from being overwhelmed by his own impulses. Even in more ordinary situations, the *occasional* use of unqualified power assertion may help instill the sense of urgency in the child that might be necessary for learning certain limits. If used sparingly, unqualified power assertion may even contribute to the child's development of a sense of identity, i.e., being openly confronted with interpersonal conflict should result in a heightened sense of self. The total avoidance of unqualified power assertion might therefore contribute to a dulling of the borderlines between self and not-self. Its excessive use, however, should have the negative social effects described in the above theory.

Hypotheses

On the basis of the above theoretical approach it was hypothesized that the parent's use of unqualified power assertive techniques, initial or reactive, would relate positively to the following characteristics of children: ***hostility toward other children; power assertiveness toward them;*** and ***resistance to***

their influence attempts. It was also hypothesized that the parent's use of unqualified power assertion would relate to the child's expression of these characteristics toward permissive authority figures, but to a lesser extent than toward children.

Stronger relationships were expected for (a) *reactive* than for *initial* unqualified power assertion because both parent and child become more involved and the interaction presumably becomes more psychologically significant once the child displays resistance to the parent; and (b) mothers' unqualified power assertion than for fathers', because of the greater amount of contact the mother has with the child.

Social Class and Unqualified Power Assertion

The literature on social class differences in child rearing (1) suggests that working class parents have a more traditionalistic approach than middle class parents. This approach is characterized by the more or less unreflective application of handed-down notions and places great stress on obedience. To a greater extent the middle class orientation involves a more self-conscious and deliberate attempt to apply the principles currently advanced by leaders in various child-rearing fields. It is less concerned with obedience and more oriented toward considering the child's needs whenever possible. It was therefore hypothesized that working class parents use more unqualified power assertion than middle class parents.

Method

Sample

The sample consisted of 10 working class families and 12 middle class families having a child in attendance at a half-day nursery school in an urban industrial community. The working class children were in a community sponsored school while the middle class children were in a private laboratory-like nursery school. All the families were intact, nonclinical, and white; the fathers were employed full time; and the mothers were housewives with no outside employment.

The working class parents were mostly Roman Catholics of East European descent and, except for two mothers and one father, native born. They averaged 11 years of formal education. Occupationally, the fathers were mainly skilled and semiskilled industrial workers.

The middle class parents were mostly Protestants who were native born, except for one mother and one father, and whose parents were born in this country or in Western Europe. They all attended college and all but three received degrees. The fathers were professionals, executives, salesmen in large corporations, or owners of middle-sized businesses.

Parental Measures of Unqualified Power Assertion

Influence technique data were obtained from tape-recorded interviews in which each parent reported in detail an account of his interaction with

the child on the day before the interview.[7] The day described was a randomly selected weekday for the mothers and both a weekday and a Sunday for the fathers. Intensive probing elicited highly detailed material on each parent-child interaction—including, for example, the initial influence technique used by the parent, the child's behavior prior to the technique, the child's response to the technique, and the parent's reaction to the child's resistance. The use of this type of interview is based on the assumption that the parent's behavior is more or less consistent from day to day. Thus, a day selected at random may be taken as a representative sample of his influence technique pattern.

Since so much rests on the parent's narration, accuracy of reporting becomes crucial. Attempts were made to design the interview so as to minimize three potential sources of error in the parent's report: forgetting (unmotivated distortion), deliberate falsification, and unconsciously motivated distortion. Forgetting is handled simply by focusing on the day before the interview and by probes which are made by the interviewer when gaps appear in the parent's account. Deliberate withholding or falsification of material is handled in part by getting the parent positively interested in the study and giving him ample opportunity to talk favorably about the child at the outset of the interview. The parent was also assured that no attempt would be made to evaluate his role as a parent and that the interview's focus was on behavioral details rather than beliefs or opinions. The requirement to recall specific details in response to frequent interviewer probes (e.g., for verbatim statements and other concrete referrents instead of vaguely descriptive terms), besides helping to motivate the parent, also seemed to force him to be logically and chronologically consistent. Our pilot interviewees typically remarked after the interview that the task of recalling so many details in their proper order required all of their concentrated energy. Some added, in response to questioning, that this concentration distracted them from interpersonal aspects of the interview situation and that as a result they were not concerned about the impression they were making. Trying to remember details, then, may result in a certain amount of detachment and loss of self-consciousness.

The third potential source of error, unconsciously motivated omissions and distortions, may also be minimized by the interview's focus on factual description. Thus, the set to recall specific details rather than meaningful wholes seems to result in the fragmentation of the event described, by weakening many of its gestalt properties. Thereby the event is divested of much of the emotional meaning it might otherwise have. In this way, any anxiety or guilt which may be associated with an event and which, if aroused, could interfere with actual recall by touching off a variety of defenses is perhaps avoided or at least considerably reduced. In psychoanalytic

[7] The interview procedure and rationale are discussed in greater detail elsewhere (3).

terms there may be an "isolation" of the event which allows details to reach consciousness without arousing painful emotional states.

The first step in processing the interview material was to have it transcribed. Then, in order to prevent any personality-relevant material, like the parent's thoughts and feelings about the event, from influencing the coding, the purely overt behavioral interaction sequences between parent and child were abstracted. The influence technique codes were then applied to these behavioral interactions by an assistant who was hired specifically for this purpose and knew nothing about the theory or hypotheses of the study.

All influence techniques used by the parent to change—prevent, terminate, initiate—the child's overt behavior were coded, regardless of what the behavior was. The only requirement was evidence that there was a discrepancy between what the parent desired and what the child wanted to do or continue doing. The parent's *initial unqualified power assertion score* (initial UPA) was the percentage of initial techniques he used which fit the category of unqualified power assertion. Similarly, the parent's *reactive unqualified power assertion score* (reactive UPA) was the percentage of the techniques employed when the child did not comply initially, fitting the category of unqualified power assertion. Percentage scores were used in order to control for volume.

Child Measures

The child data were obtained from three half-hour running account observations of each child as he behaved in the nursery school group over a two-month period, about the same period of the interview. The attempt was made, with the aid of stick figure drawings and a form of shorthand, to record everything the child did and said. The raw observation material was dictated immediately afterwards and eventually typed for purposes of coding.

The child measures were as follows:

Hostility: the percentage of all social contacts made by the child in which he expressed physical or verbal hostility.

Power assertiveness: the percentage of all influence attempts made by the child that fit our definition of unqualified power assertion. The same definition was used here as with the parents.

Resistance to influence: the percentage of all influence attempts directed at the child which he responded to in a noncompliant manner.

Separate scores were obtained for each of these measures for the child's behavior toward the teacher and toward the other children. A "difference" score for each measure was also obtained by subtracting the "teacher" score from the "children" score.

To avoid contamination, it was made certain the persons having contact with the child material knew nothing about the parents; and the persons in contact with the parent material knew nothing about the children.

TABLE 1

CLASS DIFFERENCES IN MEAN UNQUALIFIED POWER ASSERTION SCORE (UPA)

	MOTHERS			FATHERS		
UPA Score	*Middle Class*	*Working Class*	*t*	*Middle Class*	*Working Class*	*t*
Initial UPA	18.2 ($N=12$)	33.9 ($N=10$)	3.67‡	20.9 ($N=12$)	34.6 ($N=10$)	2.34*
Reactive UPA	20.9 ($N=10$)	32.4 ($N=9$)	1.40	19.8 ($N=12$)	41.5 ($N=8$)	2.97†

NOTE.—The *N*s were reduced for reactive UPA because the total number of reactive techniques for some parents were too small, i.e., their children complied with almost all initial techniques used.

* $p < .05$.
† $p < .01$.
‡ $p < .001$.

TABLE 2

CORRELATIONS BETWEEN PARENT'S INITIAL UPA AND CHILD HOSTILITY, POWER ASSERTIVENESS, AND RESISTANCE TO INFLUENCE

	MOTHERS		FATHERS	
Child Variable	*Middle Class* ($N=12$)	*Working Class* ($N=10$)	*Middle Class* ($N=12$)	*Working Class* ($N=10$)
Hostility				
Toward Children	—.16	.13	—.09	—.09
Toward Teacher	.22	.29	.56†	—.35
Difference	—.32	—.08	—.30	.09
Power Assertiveness				
Toward Children	—.18	.16	—.25	—.06
Toward Teacher	..*	—.07	...	—.12
Difference	—.20	.33	—.53†	—.06
Resistance to Influence				
By Children	—.37	—.07	.44	.30
By Teacher	—.54†	.37	.04	.04
Difference	—.04	—.20	.57†	.24

NOTE.—All correlations appearing in this and succeeding tables were computed by the rank difference method, unless otherwise indicated.

* Too many children in the middle class group had zero scores on the power-assertiveness-toward-teacher measure for correlations to be computed.

† $p < .05$.

Results and Discussion

Class Differences in the Use of UPA

Working class fathers, as expected, used initial UPA and reactive UPA to a greater extent than middle class fathers (Table 1). Significant differences between the working and middle class mothers were obtained only in initial UPA (Table 1).

A possible reason why the mother differences are less clear cut than the fathers' is that the working class mothers are more influenced than their husbands by current child-rearing notions regarding disobedience and as a result their behavior is somewhat closer to the middle class norms. That these mothers do have more contact with expert opinion than their husbands is indicated by their spontaneous references to what they had learned from the nursery school teacher and by some of the reasons given in the interview for the techniques they used. They also gave less traditional responses than their husbands to a questionnaire on child-rearing ideology ($p < .1$).

Effects of Mother's UPA on the Child

It can be seen in Table 2 that the relationships between mother's initial UPA and the child measures tend to be insignificant statistically. There is

TABLE 3

CORRELATIONS BETWEEN PARENT'S REACTIVE UPA AND CHILD'S HOSTILITY, POWER ASSERTIVENESS, AND RESISTANCE TO INFLUENCE

	Mothers		Fathers	
Child Variable	*Middle Class* ($N=10$)	*Working Class* ($N=9$)	*Middle Class* ($N=12$)	*Working Class* ($N=8$)
Hostility				
Toward Children	.42	.76†	.15	—.28
Toward Teacher	.28	.11	.23	.20
Difference	.31	.76†	—.04	—.17
Power Assertiveness				
Toward Children	.33	.70*	—.04	—.56
Toward Teacher	...	—.06	...	—.01
Difference	—.18	.60*	.35	—.43
Resistance to Influence				
By Children	.90‡	.67*	.07	.25
By Teacher	.62*	.26	.12	—.14
Difference	.72†	.58*	.10	.17

* $p < .05$.
† $p < .01$.
‡ $p < .001$.

only one exception and this is a reversal of the predicted direction. When we examine the results for mother's reactive UPA (Table 3), however, we find a pattern of correlations which are relatively high and consistent with the hypotheses. Since these correlations were in the same direction for both the middle and working class groups, it was possible to pool the data and test hypotheses with the advantages of a larger *N*.

With the pooled data most of the hypotheses were confirmed. Significant correlations were found between the mother's reactive UPA and the child's hostility toward children, power assertiveness toward children, and his resistance to children's influence attempts; his resistance to the teacher's influence attempts; and his being more hostile and more resistant toward children than toward the teacher (Table 4). The remaining correlations were also in the expected direction but not significant.

TABLE 4

CORRELATIONS BETWEEN MOTHER'S REACTIVE UPA AND CHILD'S HOSTILITY, POWER ASSERTIVENESS, AND RESISTANCE TO INFLUENCE
(Middle and Working Class Data Combined)

Child Variable	*Correlation* ($N = 19$)
Hostility	
Toward Children	.60†
Toward Teacher	.17
Difference	.51*
Power Assertiveness	
Toward Children	.48*
Toward Teacher	..
Difference	.31
Resistance to Influence	
By Children	.68‡
By Teacher	.42*
Difference	.54†

NOTE.—The "within-groups" procedure outlined by Hills (2) was used to obtain correlations based on the combined data because the *S*s were from intact groups.
* $p < .05$.
† $p < .01$.
‡ $p < .001$.

The reason for the many high correlations supporting the hypotheses involving reactive UPA, in contrast to the paucity of relationships for initial UPA, may be that the mother's influence behavior has more lasting effects when the techniques are employed in situations of heightened conflict and involvement. These conditions probably arise mainly in situations in which

the mother is reacting to the child's noncompliance. Further, the child's noncompliance may reflect the decision to assert his autonomy and challenge the authority of the parent. This may very well change the interaction from a relatively casual one for the child into one in which his integrity and self-esteem become more the issue rather than some specific desire of the moment.

It seems probable that these effects of reactive UPA would become less apparent as the child grows older. For one thing, the parent's current influence behaviors very likely become less important to the child because of the increased stabilization of his personality and patterns of interacting with the parent as well as his decreased dependence on the parent. Further, one of the assumptions underlying our hypotheses, i.e., that the child immediately responds to unqualified power assertion in terms of its arbitrary and frustrating quality and with little or no intervening ego process, becomes less tenable as the child grows older. With increasing age the child may come to realize that, although the mother does not often explain her demands, she usually has realistic bases for them, and eventually the child is able to seek out and find the reason for himself. The interposition of such cognitive responses, in addition to the guiding standards the child will have begun to internalize, should reduce his tendency to perceive unqualified power assertion in purely coercive and arbitrary terms. His reactions to these techniques might then become more similar to his reactions to other techniques. Further research is obviously needed before this view can be adequately assessed.

The Role of the Father

For the fathers the data form no consistent pattern. Among the correlations involving initial UPA (Table 2), there are two significant ones in the predicted direction and one which is a reversal. All of these occurred in the middle class group. Among the reactive UPA correlations there is only one which is close to significant and it is a reversal (Table 3). It was found in the working class group.

Although less had been expected of the father predictions as compared to the mother predictions, the lack of a consistent pattern that might provide at least some support for the hypotheses was surprising. Perhaps we underestimated the importance of the father's being away from home during most of the child's waking hours and the resulting monopoly of most of the child's time by the mother. With few exceptions, the interviews of both parents indicate that the only times the father generally spends alone with the child, other than in play activities, are during those short periods when he is at home and the mother is otherwise occupied in or out of the home, and occasionally when he puts the child to bed—most of these interactions occurring during the weekend. Furthermore, when both parents are present, the mother is usually the agent of influence and discipline. It should therefore not be surprising if the accumulated effects of the father's use of reac-

tive UPA do not approach the effects of the mother's daily repeated use of these techniques. Perhaps the child must attain a certain level of cognitive development before the father's techniques can have important effects despite his absence from the child's immediate life space for most of the day.

Although the father's behavior may thus not have a direct effect on the child—at least with respect to the variables here under investigation—there is evidence that the father does have an important indirect role. The relevant findings were obtained in another phase of the study, that which dealt with personality factors underlying the parent's use of UPA. Briefly, our expectations were that the parent's authoritarianism and power needs would relate positively to the use of UPA. In the working class group this proved to be true for the fathers but not for the mothers. In addition, the fathers' *F* scores related significantly and positively to *their wives'* reactive UPA ($r = .60$; $p < .05$). These findings in combination were interpreted to mean that the authoritarian father in this group manifests his authoritarianism toward his wife; the wife resents this and takes it out on a "safer" target, the child. There is more dramatic support for this hypothesis that the mother's reactive UPA is, to some degree, a response to her husband's authoritarian behavior toward her. A very high relationship was obtained between the extent to which the husband is more authoritarian than the wife (husband's *F* score minus wife's *F* score) and the wife's reactive UPA ($r = .84$; $p < .01$).

A similar pattern of findings were obtained in the middle class, not with the *F* scale but with a projective measure of power needs previously validated with middle class subjects (4). Thus, in the middle class the fathers' power need scores related positively to their wives' reactive UPA ($r = .73$; $p < .01$), while the wives' power needs did not relate to their own reactive UPA. Here, too, the mother's use of reactive UPA toward the child seems to be partly a displaced reaction to her husband's power-relevant behavior toward her.

Although these personality findings were brought into the discussion in order to place the role of the father in proper perspective, they are also important from another standpoint. The fact that the mothers' authoritarianism and power need scores did not relate to their use of reactive UPA raises a serious question about one of the assumptions often made in parent-child research, i.e., that it is sufficient to obtain parent data at the personality level since this underlies overt behavior.

What Is Antecedent and What is Consequent?

In this study, like many others, the variables hypothesized as being antecedent and consequent are measured concurrently rather than sequentially. The findings relating the mother's reactive UPA to the child variables (Table 4) might therefore be explained by other interpretations in which the causal sequences are the reverse of those hypothesized. Thus, it might be argued that (a) mothers tend to use reactive UPA with children who

are already hostile, power assertive, and rebellious; and (b) the child's nursery school behaviors are merely reflections of these same characteristics rather than displaced responses to the mother's reactive UPA. Although this explanation appears to rest on less solid theoretical ground than the assumption underlying our hypothesis and interpretation of the data, i.e., that parental discipline procedures are more apt to be determiners of child personality than consequences, it poses a challenge that should not be ignored. Some of our findings have direct relevance here.

Firstly, it would follow from the alternative interpretation that the child's tendency to resist the mother (a) predisposes the mother to use reactive UPA and (b) is consistent with the child's behavior outside the home. This leads to the hypotheses that the child's resistance to the mother relates positively to the mother's use of reactive UPA and to the child's resistance to others in the nursery school. These hypotheses could be tested since it was possible to obtain from the interview a score for the child's resistance to the mother's influence attempts, i.e., the percentage of initial techniques the mother used which were resisted by the child. The correlations obtained were all low and not significant ($r = .19$ between resistance to mother and mother's reactive UPA; $r = -.07$ between resistance to mother and resistance to teacher; $r = -.23$ between resistance to mother and resistance to children). *This suggests that the child's rebelliousness and resistance to control does not underlie the mother's use of reactive UPA.*

Secondly, the significant findings involving the hostility and resistance "difference scores," i.e., the relationships between mother's reactive UPA and child's being hostile and resistant *more toward children than toward teacher,* cannot readily be explained by the alternative view here being examined.

Additional evidence against this view is obtained when the relationships mentioned earlier, between the mother's reactive UPA and the father's authoritarianism and power needs, are examined. These relationships are relevant because they demonstrate that to some extent the mother's use of reactive UPA results from how her husband treats her. *Consequently, her use of reactive UPA cannot be attributable solely to the child's personality or behavior.*

It seems reasonable to conclude that mother's reactive UPA is very likely the antecedent variable and child's hostility, power assertiveness, and resistance to influence are the consequent variables.

Summary and Conclusions

The parent-child relationship was viewed as one in which the parent, by virtue of his greater physical strength, his complete control over the child's material and emotional supplies, and the existence of little external restraint, has a great deal of power (potential for compelling another to behave in a certain way) in all areas of the child's life. Because of his strong

power position, the parent is free to choose influence techniques (attempts to change the child's overt behavior) which in varying degrees assert his power or attempt to induce the child to change his behavior voluntarily. The most power-assertive techniques, those which without any qualification demand immediate compliance, are referred to as unqualified power assertion (UPA). These techniques were assumed to conflict with the child's closure and autonomy needs. It was therefore hypothesized that the parent's use of UPA either as initial attempts to change the child's behavior (initial UPA) or as reactions to his noncompliance (reactive UPA) relates positively to the child's hostility toward other children in the nursery school, his attempts to assert power over them, and his tendency to resist their influence attempts; and that these same relationships also exist *vis-a-vis* the teacher but to a lesser extent. It was also hypothesized that working class parents use more UPA than middle class parents.

The sample consisted of 12 middle class and 10 working class families having a child in attendance at a half-day nursery school. The parental UPA data were obtained from interviews in which the parent gave a fully detailed account of his interaction with the child the day before the interview. The interviews were coded for the parent's influence techniques and percentage scores were obtained for initial UPA and reactive UPA. The child data were obtained from three half-hour running account observations of each child in the nursery school. The observations were coded for hostility, power assertiveness, and resistance to influence attempts.

Working class fathers were found to use more initial and unqualified power assertions than middle class fathers. Differences between working and middle class mothers were obtained only in initial unqualified power assertion. Reasons were given for thinking this might reflect greater susceptibility to expert opinion by the working class mothers as compared to their husbands.

As regards effects on the child's personality development, the findings indicate that unqualified power assertion plays an important role when used by the mother under conditions of maximum involvement, i.e., after the child has already resisted a previous influence technique. Considerable support is given the hypotheses that the frequent use of unqualified power assertion under these conditions contributes to the development of hostility, power needs, and heightened antonomy strivings which the child displaces toward peers and, to a lesser extent, toward permissive authority figures.

Although a direct relationship between the father's use of unqualified power assertion and the child variables was not obtained, the findings suggest that the father does have an indirect effect on the child in that his power assertiveness toward his wife contributes to her power assertiveness toward the child. That is, her power assertiveness toward the child is partly a response to her husband's power assertiveness toward her. At least with respect to the variables and the age level dealt with here, then, the father appears to function like a catalyst in affecting the mother's influence be-

havior toward the child, this behavior in turn affecting the latter's personality development.

An important implication of this research is that studies of the effects of child-rearing practices should, whenever possible, include data on the parent's actual overt behavior toward the child. It is insufficient to measure just personality variables and assume these are related to overt behavior. The findings also suggest that studies of the antecedents of parental behavior should include data on the husband-wife relationship. Perhaps thinking of the entire family as a system of functionally interdependent relationships may be a fruitful guide even in research which focuses only on one dyadic relationship, e.g., mother and child.

References

1. Bronfenbrenner, U. Socialization and social class through time and space. In E. E. Maccoby, T. M. Newcomb, & E. L. Hartley (Eds.), *Readings in social psychology*. New York: Holt, 1958. Pp. 400-425.
2. Hills, J. R. Within-groups correlations and their correction for attenuation. *Psychol. Bull.*, 1957, 54, 131-134.
3. Hoffman, M. L. An interview method for obtaining descriptions of parent-child interaction. *Merrill-Palmer Quart.*, 1957, 4, 76-83.
4. Veroff, J. Development and validation of a projective measure of power motivation. *J. abnorm. soc. Psychol.*, 1956, 54, 1-8.

THE RELATION BETWEEN MOTHERS' CHILD-REARING IDEOLOGIES AND THEIR CHILDREN'S PERCEPTIONS OF MATERNAL CONTROL[1]

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The theory that parent-child relationships definitely affect personality development of children has been tested in a number of studies (2, 4, 15, 17, 18, 25). Results seldom were clear-cut, especially when attempts were made to relate specific methods of child care to aspects of the child's later personality (8, 9, 19, 20, 22). The largely negative results have been explained by Parsons (14) as being due to the fact that "specific details of child-training practices are likely to be primarily significant as expressions of the attitudes of the socializing agents, rather than through intrinsic effects" (p. 215). This article describes the findings from a research project based on extending that idea.

The authors hypothesized that most mothers have a general pattern of child-rearing values—of what constitutes the "good" child—and that this ideology affects the kind of behavior they encourage in their children. In turn, the child's perceptions of his mother are influenced by his contacts with her as she tries to inculcate in him her ideas of desirable behavior. Different child-rearing ideologies would presumably motivate mothers to adopt varying procedures for socialization with resultant differences in their children's perceptions. To discover whether this was actually the case was the purpose of this research project.[2]

The general ideology selected for analysis was that traditionally associated with the middle class (23, 26). Its values are those of Benjamin Franklin's Poor Richard—property, morality, self-reliance, diligence, thrift, and achievement (7). For parents motivated by it, this ideology is highly

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[2] In terms of the "units of causal sequence" that Brim (3) suggested for role analysis, this study is concerned with a particular pattern of child-rearing motivation and its effects upon the behavior of the child.

relevant to child-rearing situations. Its values (5, 6, 16) are expressed in such specific demands as the child's beginning at an early age to prepare for future accomplishment by accepting responsibilities around the house, learning to save money, doing well in school, keeping busy, and staying out of trouble. Inevitably the child finds these expectations of his parents at cross purposes with his own desires and impulses.

Usually, then, a child's gratification of his own wishes comes out second in a conflict with parental child-rearing values. Whether he accepts or rebels at the socialization process he is undergoing, however, his parents' ideology points to the necessary means for coping with the child's reactions. The maxim, "spare the rod and spoil the child," for example, expresses two important middle class child-rearing values—the necessity of punishing children for their misdeeds and the danger of overindulging them. Parents' display of love for the child is conditioned upon his conforming to their standards of behavior, and their withdrawal of love in response to "bad" behavior makes it a powerful control weapon. Even when the child does behave in harmony with his parents' values, unstinted warmth is not given. Otherwise, according to the ideology, he would be "spoiled," i.e., would feel that he could do anything he pleased with his parents' approval, and they would have lost this control lever. In addition, such a child would be ill prepared, according to his parents' beliefs, for the competitive, essentially hostile environment he must strive against after leaving home. But what are the effects of this elaborate rationale on the child's perception of his parents who are trying to rear him in conformity with it? It was the authors' supposition that one of his impressions would be that his parents were constantly interfering with his freedom of action to insure that he did what they wanted him to rather than what he wanted to do. He would consequently feel oversupervised and want more independence.

Method

To test the above rudimentary hypothesis, it was necessary to express it in operational terms. As an ideal type the over-all middle class ideology and the pattern of child-rearing values derived from its basic premises would be only approximated in the value systems actually held by individuals (14). Recent studies (11, 12, 27), moreover, have indicated that individuals are no longer motivated to any great extent by that particular child-rearing ideology.[3] The first problem for research, therefore, was to discover

[3] The findings of these studies suggest that mothers are motivated by a more "permissive" child-rearing value system than the traditional middle class ideology analyzed here. For this reason, it should be understood that the term middle class child-rearing ideology as used in this study refers to the ideal type described above. In contrast to these studies, however, Watson (25, pp. 232-233) had difficulty in finding parents who were "fairly constantly permissive" in the most "liberal" section of an upper-middle class suburban community in which psychoanalytic concepts were "commonly heard" in child study groups.

the child-rearing values actually held by individuals and then to see if any persons still retained a large enough proportion of viable traditional middle class values to constitute a predominant pattern. It was finally decided on the basis of experience gained in a pilot study (1) to judge a person's pattern of child-rearing values as being middle class if 75 per cent or more of the child-rearing values he expressed in an interview conformed to that type. At the same time, it was thought desirable to concentrate on mothers rather than fathers in the portions of the research dealing with ideologies, since the function of child rearing in the modern family falls primarily on the mother. For the children the main problem lay in the danger that their reactions to their mothers might be biased by some recent event. To forestall this contingency, it was decided to use college students who had been away from home long enough to have a fairly objective view of their mothers, but who were still close enough to childhood to remember much of the socialization process they had undergone. An additional advantage in working with older youths was that their mothers whose children had been born a generation ago would have been less affected by recent trends in child-rearing ideologies and accordingly more likely to possess primarily middle class values. The hypothesis to be tested in this research, therefore, became: Mothers holding the middle class child-rearing ideology will have college-age children who perceive their mothers as having overcircumscribed their children's freedom.

In selecting a group of youths who, with their mothers, were to be studied, attempts were made to control age and certain family background factors. Thus, the students used had to have the following characteristics: junior standing in 1955; living away from home at least two years; and being under 21 years of age. As for their family background, since the particular child-rearing pattern whose effects were to be analyzed was part of the middle class stereotype, they also had to come from white, middle class,[4] unbroken, native American families. Another criterion was that they have at least one sibling to make sure that the oversolicitousness often associated with mothers of an only child would not obscure the effects of the child-rearing ideology.[5] These additional requirements insured grossly similar interpersonal, cultural, and socioeconomic family influences. The sample

[4] Class status was determined by Warner's Index of Status Characteristics (24, p. 131-185) using the occupation of the father (when the mother was also employed, the rating used was the average of the father's and mother's ratings), the source of income, the dwelling area, and the type of house in which the family lived. The weighted totals ranged from 28 to 51 with 24 of the 50 families falling within the upper-middle and middle-middle categories. The sample therefore, is slightly skewed toward the lower-middle class category.

[5] To facilitate investigation, the original population was also restricted to those college students living in the county where the college sponsoring the study was located, or in adjacent counties. Since the resultant group proved to be largely rural, students with the required characteristics from two cities of over 100,000 residents and their suburbs were added. Information could then be obtained on whether the child-rearing ideology held by mothers varied with their place of residence.

finally selected, therefore, was neither random nor proportional.[6] It consisted of 27 girls and 23 boys and their mothers, 50 families in all.

Information bearing on the hypothesis was obtained by separate tape-recorded interviews with the students and with their mothers. The objective with both groups was to create an atmosphere in which the respondents would be encouraged to go beyond standard remarks and express their more deeply felt convictions and emotions. In the case of the mothers, they were encouraged to talk frankly and at length on their child-rearing experiences, especially those involving the son or daughter who had been interviewed. They were queried among other things as to behavior standards they set for their children, how they got them to behave in desired ways, what things their children did that pleased them, whether they believed in showing them affection, and, if so, when and in what ways. The student interviews were the reverse side of the coin. They focused on the mother's rules and regulations, the things the students did that their mothers approved of, the behavior that their mothers discouraged, the students' perceptions of their mothers' control and affection, as well as other memories of childhood and adolescence in which their mothers played a part.

The problem of the reliability and validity of the interview as a research method is always large. In this study, however, the same general interaction situations were described by both of the principals involved who thereby served as a check on one another. An additional validity check was incorporated. All students were interviewed on the college campus during the school year of 1955-1956 without knowing that their mothers were to be interviewed in the future. Only after a lapse of several months were the mothers then interviewed in their homes by another individual. The chances for collusion between mother and child were, therefore, minimized. But the mothers and their children, being middle class, might have been defensive about the former's severity (10) and therefore paint for outsiders a more favorable picture of their relations than was actually the case. If this were the case, it would bias the results against the hypothesis and serve to make a more stringent test of its validity. As to the reliability of the interviews, the answers throughout appeared to be fairly consistent despite their spontaneity and often unconventional quality.

The completed interviews, after being transcribed and coded, were analyzed to obtain data relevant to the hypothesis. The mothers' child-rearing

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[6] The final drawing group consisted of 65 students, 35 female and 30 male. The refusal rate was 18 per cent with three girls and six boys pleading lack of time. If in some cases those refusals stemmed more from unwillingness on the part of the individual to discuss family experiences while growing up because of unpleasant memories—all students contacted were told the subject of the interview—the final sample might have been overweighted with students who did not perceive their mothers as overcircumscribing their freedom. The interviews of two other students were discarded because of mechanical failure. No attempt was made to get in touch with the remaining four in the original population. None of the mothers of the 50 students selected refused to participate in the study.

ideologies were determined in the following manner. First, the mothers' interviews were read and the child-rearing values identified independently by the two authors. A master list of these values within their meaningful context was next made for each mother. The values on the lists of a random sample of 14 then were judged independently by the authors as to whether or not they reflected a middle class child-rearing ideology, with a percentage agreement rate of 91.8. The remaining master lists were divided and judged separately by the authors. The number of middle class values was lastly calculated as a percentage of the total child-rearing values of the mother.

To ascertain the students' perceptions of their mothers' control, a similar procedure was followed. The authors independently read each interview critically to see whether or not the student perceived his mother as overcircumscribing his freedom. Their final judgments were based on the tenor of the interview as a whole rather than on isolated remarks or incidents. Agreement was 92 per cent.

Findings

The proportion of each mother's child-rearing values that were judged as middle class ranged from 86.2 per cent to 38.3 per cent. The median was 64.9 with 57.3 the cutting point of the first quartile and 71.1, the third quartile. Thus, for the overwhelming majority of this group of mothers the middle class ideology was still influential. In fact, just six mothers had child-rearing values that were less than 50 per cent middle class. There were, however, only three mothers who possessed middle class child-rearing ideologies according to the definition previously decided upon, i.e., 75 per cent or more of the total. (Four more mothers' percentages fell less than one point below this limit, being more than 74 per cent.) To increase the number of available cases for statistical analysis, the definition was modified to 71 per cent, which in this particular group of mothers included all cases in the fourth quartile, or 13 mothers considered as having middle class child-rearing ideologies.[7]

Seven of the college students had been judged to have perceived their mothers as overcircumscribing the students' freedom. These were students who said they were oversupervised by their mothers. In the words of one student, "I felt I had a steel clamp on." As to the child-rearing ideologies of these students' mothers, 77.1, 77.4, 73.5, 69.0, 66.7, 58.5, and 55.0 per cent, respectively, of their child-rearing values were judged as being middle class. Thus, only three of these mothers had middle class child-rearing patterns. Using the chi square test on the data, the level of probability was too high to substantiate the hypothesis of an association between mothers having the

[7] The term middle class child-rearing ideology as used in the remainder of the article conforms to this definition that 71 or more per cent of a mother's child-rearing values were judged as being middle class.

middle class child-rearing ideology and students' perceptions of being overcircumscribed, although the relationship was in the hypothesized direction[8] (Table 1).

TABLE 1

ASSOCIATION BETWEEN STUDENTS' PERCEPTIONS OF MATERNAL CONTROL AND CERTAIN SELECTED FACTORS

Selected Factors	χ^2	*df*	*p*
Mothers' child-rearing ideologies*	.426	1	.52
Sex	1.978	1	.17
Place of rearing†	.328	1	.58
Number of siblings‡	.109	1	.75
Mothers' affection-giving values§	1.256	1	.27

* Middle class; not middle class.
† Rural; urban.
‡ One; more than one.
§ Middle class; not middle class.

Factors other than the mothers' child-rearing ideologies, however, might account for the differences in the college students' perceptions of their mothers' control. One of these was obviously sex, since six of the seven students who perceived their freedom as being overcircumscribed by their mothers were girls. This result was consistent with research findings that the sex of the child influences the child-rearing practices of a mother. Mothers make greater demands on preschool girls for nondependent and nonaggressive submissive behavior than on boys of the same age (15, 17, 18). In adolescence, too, girls are usually allowed less freedom of action than boys. The youth's sex, therefore, and not his or her mother's child-rearing ideology, might account for the students' differential perceptions of maternal control.

The place of residence where the student grew up also could play a part in his perceptions of his mother's control. The greater apparent hazards associated with the denser population of urban as contrasted with rural areas, rather than a specific child-rearing ideology, might cause town mothers to exercise greater supervision over their children than rural mothers would feel necessary, with resultant differences in their children's perceptions of maternal control.

Another factor influencing these perceptions might be the number of siblings. Mothers of two children, other things being equal, would have more time to give to supervising them than mothers of larger families and their children would consequently be more likely to feel their freedom was overcircumscribed.

[8] Since this study is exploratory, the level of significance was set at .10. The Yates correction was used on all chi square tests.

To investigate the influence of these factors of sex, place of residence, and number of siblings on the students' perceptions of their mothers' control, the original universe was subdivided according to these factors. The chi square test was then applied with the results shown in Table 1. None of the chi squares was large enough to be significant, although the associations were all in the hypothesized directions. With a probability level of .17 the association between sex and the students' perceptions came closest to approaching significance. Since the hypothesized tendency for girls to perceive their mothers as overcircumscribing their freedom oftener than boys came fairly close to being supported, the authors thought the original hypothesis might be confirmed for girls. The universe of students was therefore divided according to sex, and the relationship between mothers' child-rearing ideologies and their children's perceptions of maternal control was investigated for each category. The results of the chi square test of the partial association within the subuniverse of the male students, as expected, was not significant. The same test within the subuniverse of the female students was large enough, however, to permit rejection of the null hypothesis (Table 2). It appears then that the original hypothesis is supported when limited to girls and that there is some relationship between mothers having a middle class child-rearing ideology and their daughters' perceptions of them as overcircumscribing their freedom.

TABLE 2

ASSOCIATION BETWEEN MOTHERS' CHILD-REARING IDEOLOGIES* AND STUDENTS' PERCEPTIONS OF MATERNAL CONTROL,† WITH SEX OF STUDENT HELD CONSTANT

Sex of Student	χ^2	*df*	*p*
Females	2.799	1	.10
Males	.199	1	.67

* Middle class; not middle class.
† Freedom overcircumscribed; freedom not overcircumscribed.

Findings from the previous exploratory study (1), however, suggested that the kind of affection-giving values held by the mother was a crucial intervening factor in the relationship between her child-rearing ideology and her child's perception of maternal control. Mothers interviewed at that time who held values that in most areas conformed to a middle class ideology but whose values in the area of affection-giving ran counter to this ideology *did not* have children who perceived their mothers as overcircumscribing their freedom. In contrast, mothers whose values in the affection-giving area as in other areas were consistent with the middle class ideology *did* have children who perceived their mothers as overcircumscribing their

freedom. Thus, the fact that the former group of mothers (disagreeing with the affection-giving values of the latter group of mothers) believed in demonstrating an unconditional love for their children seemed to affect the spirit in which they went about inculcating in their children ambition, goodness, and the other middle class virtues upon which there was complete agreement between the two groups of mothers. At least, the children of the first group apparently sensed something underlying the attitudes of their mothers toward them that made them perceive their mothers' control differently from the children of mothers whose affection-giving values were part of the middle class child-rearing ideology, even though both groups of mothers held similar control values.[9]

To see whether the factor of affection-giving played an equally important part in the present study, the authors formulated the following hypothesis: Students whose mothers hold affection-giving values that are primarily middle class will perceive their mothers as overcircumscribing the students' freedom. To test this hypothesis, a procedure similar to that used in determining the mothers' child-rearing ideologies was followed. The values in the affection-giving area were abstracted from each mother's master list of child-rearing values. The proportion of values judged previously as conforming to the middle class ideology was expressed as a percentage. The mothers' percentage scores when ranked encompassed the range from 100 to zero with 35.415 being the median.[10] The mothers' scores were then divided at 66.67 per cent, the demarcation point of the fourth quartile, and mothers in this quartile arbitrarily defined as having primarily middle class affection-giving values. A chi square test of the association between the mothers' kind of affection-giving values and their children's perceptions of maternal control was made first. Though in the expected direction, it showed a probability level of only .27, not large enough to reject the null hypothesis. The relationship originally hypothesized between mothers' child-rearing ideologies and their children's perceptions of maternal control was tested, however, within each of the two subuniverses of mothers, those

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[9] Other investigators have stressed the importance of maternal affection. Sears, Maccoby, and Levin (18) found that "maternal coldness was associated with the development of feeding problems and persistent bed-wetting. It contributed to high aggression. It was an important background condition for emotional upset during severe toilet training, and for the slowing of conscience development" (p. 483). In connection with the latter, Parsons (14) too has noted that "value orientation patterns can only be internalized from outside" if there is a reciprocal attachment between ego and alter, in this instance the child and his mother (footnote 6, p. 213).

[10] Application of the Mann-Whitney U Test to the data showed a difference significant at the .05 level between the percentages of affection-giving values judged as being middle class possessed by the seven mothers perceived by their children as overcircumscribing their freedom and those of the remaining group of 43 mothers. The result from using the same test on the difference between the percentage scores of the 13 women possessing the middle class child-rearing ideology compared with those of the other 37 mothers also was significant, at the .003 level. *See* Siegel (21, pp. 120-126) for the statistical procedure used.

having primarily middle class affection-giving values, and those who did not. In neither case was the chi square significant (Table 3).

TABLE 3

ASSOCIATION BETWEEN MOTHERS' CHILD-REARING IDEOLOGIES* AND STUDENTS' PERCEPTIONS OF MATERNAL CONTROL† WITH THE AFFECTION-GIVING VALUES OF THE MOTHERS HELD CONSTANT

Affection-Giving Values of the Mothers	χ^2	*df*	*p*
66.7 per cent and over middle class	.972	1	.33
Under 66.7 per cent middle class	.077	1	.79

* Middle class; not middle class.
† Freedom overcircumscribed; freedom not overcircumscribed.

DISCUSSION

The primary hypothesis that there is a relation between mothers possessing the middle class child-rearing ideology and their children perceiving them as overcircumscribing their freedom was upheld only for girls. This raises the question of why it was not equally true of boys. The answer probably lies in the different role prescriptions for boys and girls of the middle class child-rearing ideology of mothers. Boys are supposed to be raised in such a way that they will have internalized middle class values. The control that is exercised over their day-by-day activities to accomplish this, however, should not be so complete, according to middle class doctrine, that boys lose the spontaneity and aggressiveness necessary for class mobility. Thus, they are rather expected to have behavioral lapses, "boys will be boys" phases, when their behavior fails to conform to middle class standards. Although deprecating them, parents may actually welcome such episodes as evidence that the mother has not made a "sissy" out of her boy and that he still retains the qualities necessary for the rough and tumble of the occupational world as pictured by the middle class ideology. Girls, on the other hand, not only are expected to have stricter behavior standards but are required to live up to them partly because their example will supposedly make the less socialized male attempt to live up to the same high standards. (The potent effect on a man's behavior of the "love of a good woman" has long been one of the most cherished beliefs in the middle class rationale.) Mothers holding the middle class child-rearing ideology, therefore, are prepared to be less rigid with their sons and to give them independence sooner than they will their daughters. Girls, who are reared according to this ideology, have cause to perceive their freedom of action as being limited while this would not be the case with the boys.

The influence exercised by the kind of affection-giving values held by the mothers interviewed was not so important as in the previous exploratory

study. It was in the hypothesized direction, however, with youths whose mothers held primarily middle class affection-giving values as well as middle class child-rearing ideology showing some tendency to perceive their mothers as overcircumscribing their freedom. This tendency was less for children of mothers adhering to the middle class ideology in areas other than that of affection-giving. Though mothers whose children perceived them as overcircumscribing had a significantly higher percentage of middle class affection-giving values, these values seemed to affect youths' perceptions of maternal control only in conjunction with the mothers' values in other areas of child-rearing, instead of independently. Perhaps this was because there were no women who combined the middle class child-rearing ideology with completely nonmiddle class, affection-giving values. It may be that only in the case of such women would affection-giving values have a crucial intervening effect on youths' perceptions of their mothers' control.

One of the most interesting findings, however, was that the traditional middle class child-rearing ideology still played an important part in the thinking of the great majority of these middle class mothers, an outcome more consistent with the results of Watson's (25) research than with those of the other investigators cited (11, 12, 27). It may be objected that these women did not represent the present generation of mothers, but 78 per cent of the students interviewed when questioned as to their own child-rearing values had a majority or more that conformed to the same ideology. This was true, moreover, of 18 of the 27 girls who are just now entering their child-rearing period. It would seem therefore that the newer, more permissive child-rearing ideology advocated by many child guidance authorities has not been as widely accepted by the members of the middle class as had been supposed. Certain infant care practices in such areas as feeding and toilet training may have been modified to conform to the experts' dicta, but the goals parents set for children and the methods parents use to attain them appear relatively unaffected.[11]

The results of this study tend to support the rather obvious body of theory—so hard to demonstrate in actual research—that parent-child relationships do affect the children. If the sample of mothers interviewed had been larger and had included women holding a wider range of child-rearing ideologies, instead of being clustered about the middle class ideal type, the findings might have been more clear-cut. Further investigation also may show that there is a certain irreducible minimum of so-called "middle class values" that are generally held by parents, regardless of class, whose internalization by children during the socialization process is essential for their adequate performance of occupational roles in a complex industrial society.

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[11] The fact that Watson (25, pp. 232-233) also found it hard to locate parents who held the newer child-rearing ideology in an eastern suburban area lends credence to the authors' belief that the similar findings of this study are not limited to the particular sample of Midwesterners interviewed.

References

1. Aldous, Joan, & Kell, Leone. Child rearing values of mothers in relation to their children's perceptions of their mothers' control *Marriage Fam. Living*, 1956, 19, 72-74.
2. Baldwin, A. L. The effect of home environment on nursery school behavior. *Child Develpm.*, 1949, 20, 46-61.
3. Brim, O. G., Jr. The parent-child relation as a social system: I. Parent and child roles. *Child Develpm.*, 1957, 28, 343-364.
4. Carter, D. C. The influence of family relations and family experiences on personality. *Marriage Fam. Living*, 1954, 16, 212-215.
5. Davis, A. American status systems and the socialization of the child. *Amer. sociol. Rev.*, 1941, 6, 345-354.
6. Davis, A., & Havighurst, R. J. Social class and color differences in child rearing. *Amer. sociol. Rev.*, 1946, 11, 698-710.
7. Franklin, B. *The prefaces, proverbs and poems of Benjamin Franklin.* New York: Putnam's, n.d.
8. Goldman-Eisler, Frieda. Breast feeding and character formation. In C. Kluckhohn & H. A. Murray (Eds.), *Personality.* New York: Knopf, 1954. Pp. 146-184.
9. Harris, D. B., Gough, H. G., & Martin, W. E. Children's ethnic attitudes: II. Relationship to parental beliefs concerning child training. *Child Develpm.*, 1950, 21, 169-181.
10. Havighurst, R. J., & Davis, A. A comparison of the Chicago and Harvard studies of social class differences in child rearing. *Amer. sociol. Rev.*, 1955, 20, 438-448.
11. Littman, R. A., Moore, R. C. A., & Pierce-Jones, J. Social class differences in child rearing. *Amer. sociol. Rev.*, 1957, 22, 694-704.
12. Maccoby, Eleanor E., & Gibbs, Patricia A. Methods of child rearing in two social classes. In W. E. Martin & Celia B. Stendler (Eds.), *Readings in child development.* New York: Harcourt, Brace, 1954. Pp. 380-396.
13. Parsons, T. *The structure of social action.* Glencoe, Ill.: Free Press, 1949.
14. Parsons, T. *The social system.* Glencoe, Ill.: Free Press, 1951.
15. Radke, Marion J. The relation of parental authority to children's behavior and attitudes. *Univer. Minn. Inst. Child Welf. Monogr.*, 1946, No. 22.
16. Riesman, D. *The lonely crowd.* New Haven: Yale Univer. Press. 1950.
17. Sears, R. R. *et al.* Some child rearing antecedents of aggression and dependency in young children. *Genet. Psychol. Monogr.*, 1953, 47, 2-31.

18. Sears, R. R., Maccoby, Eleanor E., & Levin, H. *Patterns of child rearing.* Evanston, Ill.: Row, Peterson, 1957.

19. Sewell, W. H. Infant training and the personality of the child. *Amer. J. Sociol.,* 1952, 58, 150-159.

20. Sewell, W. H., & Mussen, P. H. The effects of feeding, weaning and scheduling procedures on childhood adjustment and the formation of oral symptoms. *Child Develpm.,* 1952, 23, 185-191.

21. Siegel, S. *Nonparametric statistics for the behavioral sciences.* New York: McGraw-Hill, 1956.

22. Straus, M. A. Anal and oral frustration in Sinhalese personality. *Sociometry,* 1957, 20, 21-31.

23. Tawney, R. H. *Religion and the rise of capitalism.* New York: Harcourt, Brace, 1926.

24. Warner, W. L., Meeker, Marsha, & Eels, K. *Social class in America.* Chicago: Science Research Associates, 1949.

25. Watson, G. Some personality differences in children related to strict or permissive parental discipline. *J. Psychol.,* 1957, 44, 227-249.

26. Weber, M. *The Protestant ethic and the spirit of capitalism.* (Trans. by Talcott Parsons.) New York: Scribner's, 1930.

27. White, Marsha S. Social class child rearing practices and child behavior. *Amer. sociol. Rev.,* 1957, 22, 704-712.

THE EFFECT OF LONG-TERM ILLNESS OF CHILDREN ON THE EMOTIONAL ADJUSTMENT OF PARENTS[1]

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This study represents an attempt to gain some understanding of the dynamics occurring within the parents' emotional life when their child is hospitalized with a severe, often fatal disease. The population studied consisted of two groups: children who had received a diagnosis of acute leukemia, and a group of children suffering from other cancerous non-leukemic diseases.

The etiology of leukemia is quite nebulous at present. With regard to the progress of the disease, Bozeman *et al.* (2) reported that

> Despite remarkable advances in treatment, leukemia is invariably fatal. No permanently effective control, spontaneous resolution, or medically substantiated cure has been reported. The course of childhood leukemia under treatment is extremely variable and cannot be predicted in advance for any single child. Some children have repeated remissions and readily respond to treatment during relapse, without severe symptoms, until the inevitable downward course begins. Some have incomplete or short remissions with intermittent symptoms of the disease (fever, easy bruising, ecchymosis, petechiae, swelling of nodes, pallor, poor appetite, irritability, fatigue). Some have toxic reactions to various drugs (mouth lesions, diarrhea, abdominal pain, nausea) before a remission can be obtained. Ultimately, all children fail to respond to any drugs used in treatment (p. 1).

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[1] This study was done while the author was a Hogg Foundation Research Fellow at the University of Texas, M. D. Anderson Hospital and Tumor Research Institute.

Child Develpm., 1960, 31, 157-171.

The main purpose of the study was to investigate how, if in any way, the parents of leukemic children differed from the parents of nonleukemic children in their backgrounds, occupations, and emotional adjustment.

METHOD

The subjects selected were the parents of 10 leukemic children and 10 nonleukemic children suffering from other neoplastic diseases. All children whose father and mother could be seen at the hospital and also were willing to take the psychological battery of tests were contacted within several days after they had entered the hospital, until 10 had been obtained for both the leukemia and nonleukemia categories.

Two of the leukemia patients, however, were readmissions. These cases were accepted within the framework of the study because of the need to complete the study within the allotted time, though they biased the data to an unknown degree.

The following actuarial data were collected from the parents and hospital files: age of child (patient), father, mother; number of children in family; number of years parents had been married; education of father, mother (7-point scale); faith of father, mother (Protestant or other); frequency of church attendance of father, mother (5-point scale); disease of child (leukemia, nonleukemia); occupation of father (11-point scale); medical payment classification of patient (6-point scale).

The two full-time pediatricians assigned to the ward, as a result of their knowledge of the disease and discussions with the parents, made the following ratings for each parent on a 5-point scale: "information given about the disease," "discussion of prognosis," "emotional adjustment to the child's illness," and the "intellectual understanding of the disease." They also rated the prognosis of the child's disease as either "good or unknown," or "bad."

The attending nurses[2] rated each parent on a 5-point scale for the variables, "relationship to child," "relationship to spouse," and "adjustment to the hospital routine."

The author administered the Thematic Apperception Test (Cards 3GF, 7BM, 6BM, 1, 18BM, 18GF, 2, 10, 6GF, 5, 7GF, 9GF) to one of the parents while the other was filling out a shortened 50-item form of the Taylor Manifest Anxiety Test as well as the Texas Religious Attitude Scale.

The TAT stories were scored on a 5-point scale for "emotional tone," and for story "outcome" as described by Eron (3). A "difference" score was obtained by subtracting the sum of the scores for emotional tone of the stories from the sum of the outcome score.

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[2] The author wishes to express his gratitude for the cooperation of Drs. Wataru Sutow, Grant Taylor, and Margaret P. Sullivan, and nurses Miss Elida Flores, Florence Holbart, Mrs. Harrison, and Margaret Peterson, for serving as raters.

TABLE 1

CORRELATION MATRIX FOR 18 VARIABLES FOR ALL PARENTS CONSIDERED AS A GROUP ($N = 40$)

	1 Education	2 Church Attendance	3 Disease †	4 Father's Occupation	5 Medical Payment	6 Doctor's Prognosis ‡	7 Information	8 Discussion	9 Emotional Adjustment	10 Intellectual Understanding	11 Parent-Child Relationship	12 Adjustment to Hospital Routine	13 Parent-Parent Relationship	14 Taylor Anxiety Score	15 TAT Tone	16 TAT Outcome	17 TAT Tone–Outcome Difference	18 TAT Approach
1. Education																		
2. Church Attendance	39*																	
3. Disease	−15	−36*																
4. Father's Occupation	63**	28	−03															
5. Medical Payment	65**	−03	−18	50**														
6. Doctor's Prognosis	05	59**	+95**	08	10													
7. Information	06	−17	00	04	−07	−05												
8. Discussion	23	−11	−34	21	11	−26	93**											
9. Emotional Adjustment	18	−23	−26	−03	−11	−35*	12	03										
10. Intellectual Understanding	49**	−04	−21	38*	14	−28	−03	−00	82**									
11. Parent-Child Relationship	26	−31	−30	12	14	−25	−15	−21	66**	61**								
12. Adj. to Hosp. Routine	29	−25	−04	35*	18	−10	−01	−09	62**	62**	95**							
13. Parent-Parent Relationship	35*	−17	−21	40**	13	−30	−03	−07	70**	86**	78**	91**						
14. Taylor Anxiety Score	−07	03	−02	−30	−39*	−08	−02	−11	−02	−04	22	−11	−10					
15. TAT Tone	−05	−04	−58**	−26	−06	−53**	10	04	−16	−09	05	−18	−04	31*				
16. TAT Outcome	−31*	07	−07	−18	−38*	−12	−23	−13	−04	13	−08	−09	12	16	17			
17. TAT Tone–Outcome Difference	−23	09	+30	−00	−29	17	−30	−14	07	17	−10	03	13	−05	−47**	79*		
18. TAT Approach	33*	21	−31*	08	−01	−20	−05	13	12	20	07	−09	06	20	−12	05	12	

* Significant at .05 level.
** Significant at .01 level.

† A plus sign indicates leukemia, a minus sign nonleukemia.
‡ A plus sign indicates a bad prognosis, a minus sign a good or unknown prognosis.

A scale devised by Carson McGuire which measures the "approach" to the TAT, ranging from spontaneous projection on the part of the subject to refusal to tell a story, also was utilized. Lastly, two pediatricians rated the "progress" of the child in terms of his physical condition. Because of the difficulties in determining physical condition, and the fact that several different diseases were involved, it was decided to have the children ranked in order of the "goodness" of their response to the disease. This ranking was "phenotypical" in that the "blood picture" and other "genotypical" factors were ignored. The reasons for substituting "phenotypical" rather than "genotypical" rankings were twofold. First, since the purpose of the study was to study the parents' emotional adjustment, it was felt that they would react more to the child's overt appearance than to his "blood picture." Secondly, no clear-cut criteria exist for describing the genotypical reaction to the disease. Accordingly, a child having leukemia, but who had not as yet been incapacitated in any way because of the disease, was ranked 1 (good progress), though, because of the fatal nature of the disease, it might be expected that his course would eventually go downhill. The ranks were normalized by McCall's T scale method on the assumption that phenotypical physical reactions to disease were normally distributed for the population studied.

TABLE 2

RELIABILITY OF RATINGS AND TEST SCORES

Measure	*Type of Reliability*	*Type of Correlation*	*Value*
Physicians			
Emotional Adjustment of Parents	Inter-Judge ($N=2$)	Pearson	.83
Intellectual Understanding of Disease by Parent	Inter-Judge ($N=2$)	Pearson	.64
"Phenotypical" Progress of Disease	Inter-Judge ($N=2$)	rho	.84
Nurses			
Parent-Child Emotional Relationship	Inter-Judge ($N=4$)	Average Pearson	.59
Parent Adjustment to Hospital Routine	Inter-Judge ($N=4$)	Average Pearson	.62
Parent-Parent Emotional Relationship	Inter-Judge ($N=4$)	Average Pearson	.70
Tests			
Taylor Anxiety Scale	Test-Retest	Pearson	.80's*
TAT Emotional Tone	Inter-Judge	Pearson	.86†
TAT Outcome	Inter-Judge	Pearson	.75†
TAT Tone–Outcome Difference		Pearson	.77
TAT Approach	Inter-Judge ($N=2$)	Pearson	.73‡

* Range obtained by Taylor from several populations over varying periods was .81 to .89.

† Reported by Eron (3).

‡ The author is grateful for the time given by Dr. Fred Damerin in serving as a rater along with the author in scoring this scale.

Treatment of the Data

The means of the ratings of the two pediatricians and four nurses were used as "best estimates" for the variables derived from rating scores. In the interest of brevity variables which revealed no psychologically meaningful information (age of parents, number of years parents had been married, number of children in the family, religious faith, religious attitude score, progress of disease in the child, and age of child) have been omitted from Table 1. The remaining 18 variables and their intercorrelations are indicated in Table 1 with corrections for coarse groupings having been made where necessary. The reliabilities of the measures used are shown in Table 2.

The findings to be discussed in the next section are the significant relations between any two of the 18 variables in the correlation matrix (Table 1) for all of the 40 parents considered as one group. In the interests of space only correlations considered pertinent will be discussed.

Results

The data indicated a significant relationship between "emotional adjustment" and the variables "education," "intellectual understanding," and "occupation." All of the latter three variables correlated significantly with each other but the intercorrelations were not sufficiently high to indicate that all measured the same thing.

"Education" correlated significantly with "parent-parent relationship" (.35); "intellectual understanding" related to "emotional adjustment" (.82), "parent-child relationship" (.60), "parent-parent relationship" (.86), and "adjustment to the hospital routine" (.62). "Father's occupation" correlated with "intellectual understanding" (.38), "adjustment to hospital routine" (.35), and "parent-parent relationship" (.40).

The various types of emotional adjustment related highly to each other. Thus, "emotional adjustment," judged by the pediatricians, correlated .70 with "parent-parent relationship," and .66 with "parent-child relationship," the latter two ratings made by nurses. The ability to "adjust to the hospital routine" correlated highly with "parent-parent" (.78) and "parent-child relationship" (.95). In this case, however, the fact that the same judges (nurses) rated all three variables limits the psychological implications of the findings.

The role of religion was investigated via the score achieved on the Texas Religious Attitude Scale (an unpublished Thurstone type scale constructed several years earlier) and the ratings made by the parents as to the frequency of their attending church. The "religious attitude" score correlated only with "church attendance" (.63) and hence was not listed in Table 1. "Church attendance," however, also correlated positively with the child's having "leukemia" (.36), the poorness of the doctor's "prognosis" (.59),

and the "parent-child relationship" (—.31). The parents had been instructed to give their usual frequency of attendance prior to the illness. It is difficult to interpret the correlation of "church attendance" with "leukemia" unless one presumes that the parents of leukemic children gave their postdisease attendance rather than the predisease attendance despite the instructions. The negative correlation between "parent-child relationship" and "church attendance" was unexpected since "church attendance" correlated positively with "education," and "education" has been shown to be related to several different measures of emotional adjustment. More work will need to be done in this area before definitive conclusions can be reached.

The role of the TAT projective technique was largely that of reflecting the overt strain of the disease upon the parents. As might be expected, the "approach" to the TAT (the extent to which the parent "projected" himself into the stories) was related to the "education" of the parent (.33) and negatively related to the "disease" (—.31), i.e., leukemia parents, concerned more about the disease, projected themselves less into the test than nonleukemia parents. Moreover, the "emotional tone" of the stories also was lower (more negative) for these parents (—.58).

An unexpected finding was the fact that anxiety on the Taylor Scale correlated *positively* with the "pleasantness" of tone of the stories. The "outcome" of the stories was inversely related to the "medical payment classification" as well as to the "education" of the parents. It would seem then that the more educated, high socioeconomic group was more conservative and perhaps more realistic with regard to the disease in that the "tone" of their stories was more negative.

Differences between Mothers and Fathers

To see whether any sex differences existed, all parents were divided into two groups of 20 each by sex, and correlations for the variables were obtained for each sex separately. Next, t tests were made for differences in

TABLE 3

SIGNIFICANT DIFFERENCES BETWEEN MOTHER AND FATHER CORRELATIONS

Variables	*Mother* r	*Father* r	$P_{diff.}$
Father's Occupation vs. Education	.39	.85	<.05
Father's Occupation vs. TAT Approach	—.30	.62	<.01
Taylor Anxiety Score vs. Adjustment to Hospital ..	—.45	.41	<.05
Parent-Parent Relationship vs. TAT Outcome	—.12	.55	<.05

NOTE.—The variables "faith," "disease," and "prognosis," which were measured dichotomously, were not suitable for correlation with an N as small as 20.

each correlation between mothers and fathers. Few differences were found. Of the total of 231 intercorrelations computed for 22 variables (the variables "faith," "disease," and "prognosis" were not suitable for computation with an *N* as small as 20) in each matrix, only four significant differences were found. This small number of differences is within chance expectations. Hence, the correlations will be discussed with the understanding that they are suggestive rather than definitive.

Concerning the comparison of correlations (Table 3), the fathers' "approach" to the TAT seemed related to their occupation level in that the higher the occupation level the greater the likelihood that the father had cooperated in taking the test. An unexpected finding was that the fathers' "adjustment to the hospital routine" seemed to have been positively related to their Taylor Anxiety score. With regard to the mothers, the opposite occurred in that those adjusting readily to the hospital situation showed little anxiety. One is tempted to speculate that knowing that their husbands

TABLE 4

DIFFERENCES BETWEEN MEAN RATINGS FOR FATHERS AND MOTHERS
(Where ratings are involved, higher scores have a positive meaning.)

Variable	MEAN		*t*
	Fathers	*Mothers*	
Age of Parent	34.8	31.9	1.18
Years Married	10.8	10.8	†
Number of Children	2.4	2.4	†
Education	3.1	3.3	.36
Church Attendance	2.6	2.7	.28
Father's Occupation	4.7	4.7	†
Amount of Medical Payment	1.4	1.4	†
Information Received	3.2	3.3	.30
Discussion of Disease	3.0	3.1	.24
Emotional Adjustment	2.8	2.9	.14
Intellectual Understanding	2.5	2.6	.15
Parent-Child Relationship	2.1	2.1	.00
Adjustment to Hospital Routine	2.2	2.2	.00
Parent-Parent Relationship	2.3	2.2	.62
Taylor Anxiety Scale	12.7	15.1	.91
Religious Attitude Score	74.7	78.6	2.04*
TAT Emotional Tone	29.1	27.9	1.10
TAT Outcome	36.1	37.3	1.31
TAT Tone–Outcome Difference	7.0	9.4	1.14
TAT Approach	66.3	63.0	1.25
Age of Child	5.8	5.8	†

* Significant at .05 level.
† *t* test not applicable.

Table 5

CORRELATION MATRIX FOR 22 VARIABLES FOR PARENTS OF LEUKEMIA CHILDREN ($N = 20$)

	1 *Age of Parent*	2 *Years Married*	3 *Number of Children*	4 *Education*	5 *Church Attendance*	6 *Father's Occupation*	7 *Medical Payment*	8 *Information*	9 *Discussion*	10 *Emotional Adjustment*	11 *Intellectual Understanding*	12 *Parent-Child Relationship*	13 *Adjustment to Hosp. Routine*	14 *Parent-Parent Relationship*	15 *Taylor Anxiety Score*	16 *Religious Attitude Score*	17 *TAT Tone*	18 *TAT Outcome*	19 *TAT Tone–Outcome Diff.*	20 *TAT Approach*	21 *Progress of Disease*	22 *Age of Child*
1. Age of Parent																						
2. Years Married	81																					
3. Number of Children	59	72																				
4. Education	23	−01	−14																			
5. Church Attendance	−08	29	39	16*																		
6. Father's Occupation	63*	48	25	55	12																	
7. Medical Payment	47	20	−07	56	−45**	53																
8. Information	18	−04*	−07*	31	−28	54**	34**															
9. Discussion	17	−05*	12**	43*	02	51*	37**	98														
10. Emotional Adjustment	07	00	−28	60**	−03	34*	44**	−32**	−41**													
11. Intellectual Understanding	27	20	−12	66	13	61	43*	−17	−21	100**												
12. Parent-Child Relationship	16	−17	−34	26	−42	17	24	−29	−44*	65	61											
13. Adjust. to Hosp. Routine	21	−14	−32	36	−41	46	40*	−10	−18	71	73	97*										
14. Parent-Parent Relationship	11	−16	−35	37	−27	48	37	−13	−26	87*	84	81	98**									
15. Taylor Anxiety Score	−33*	−47*	−36	−10	−00	−45	−56	−18	−23	−17	−26	33	04	−05								
16. Religious Attitude Score	−10	26	15	15	78	17	−27	−23	−11	11	18	−31	−24	−13	−18							
17. TAT Tone	−12	−00	07	−54*	−01	−37	−64*	−03	−24	−48	−58*	−33	−47	−47	28	−11						
18. TAT Outcome	−13	12	16	−44	34	−26	−45	−47	−33	−33	−28**	−23	−27	−27**	28	18	13					
19. TAT Tone–Outcome Diff.	−05	11	11	−12	32*	−04	−07	−42	−17	−05	06	−04	−12	−07	10	22	−41	85				
20. TAT Approach	−26	−09	−04	17	50	−20	−33	−14	−10	−03	−05	−15	−39	−24	35	25	17	08	−01			
21. Progress of Disease	−12	−03	−07	−36	−45*	−17	−19	09	−35	11	−10	04	−07	08	−01	−25	41	−25	−45	09		
22. Age of Child	41	63	44	01	36	20	−06	−58	−62	43	42	12	09	21	−32	47	10	11	04	05	95**	

NOTE.—The variables "disease," "faith," and "prognosis" were not suitable for computation with an N as small as 20. * Significant at .05 level. ** Significant at .01 level.

Table 6

CORRELATION MATRIX FOR 22 VARIABLES FOR PARENTS OF NONLEUKEMIA CHILDREN ($N = 20$)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Age of Parent	*Years Married*	*Number of Children*	*Education*	*Church Attendance*	*Father's Occupation*	*Medical Payment*	*Information*	*Discussion*	*Emotional Adjustment*	*Intellectual Understanding*	*Parent-Child Relationship*	*Adjustment to Hosp. Routine*	*Parent-Parent Relationship*	*Taylor Anxiety Score*	*Religious Attitude Score*	*TAT Tone*	*TAT Outcome*	*TAT Tone–Outcome Diff.*	*TAT Approach*	*Progress of Disease*	*Age of Child*
1. Age of Parent																						
2. Years Married	69																					
3. Number of Children	65	67																				
4. Education	−03	34	−00																			
5. Church Attendance	30	35	−12	75*																		
6. Father's Occupation	02*	21	37	71	47																	
7. Medical Payment	−15	37	00	65	45**	53																
8. Information	−30	−71*	−71*	−28	−07	−54**	−58**															
9. Discussion	−34	−73*	−68*	−22*	−08	−30*	−50**	99														
10. Emotional Adjustment	05	−35	−27	−40**	−31	−48*	−89**	81**	80**													
11. Intellectual Understanding	06	14	08	23	−08	06	−32*	22	31	48**												
12. Parent-Child Relationship	−10	00	−15	22	05	−03	−24	27	29*	65	45											
13. Adjust. to Hosp. Routine	−14	−15	−01	16	−06	18	−27*	10	11	49	34	85*										
14. Parent-Parent Relationship	−09	04	−02	29	05	27	−24	18	18	43*	80	56	85**									
15. Taylor Anxiety Score	39*	33*	24	−06	07	−16	−21	15	05	14	29	04	−36	−17								
16. Religious Attitude Score	−23	09	−29	41	52	04	39	03	−02	−29	−15	05	−09	−03	−07							
17. TAT Tone	32	32	−11	09*	32	−30	14*	16	−04	−12	25*	−07	−16	12	23	15						
18. TAT Outcome	09	14	09	−13	−16	−10	−33	07	17	32	75**	23	25	63**	04	−03	25					
19. TAT Tone–Outcome Diff.	−13	−07	15	−18	−35*	10	−40	−03	20	37	52	26	34	52	−12	−13	−43	77				
20. TAT Approach	13	14	04	46	37	38	01	03	15	17	29	09	−09	24	05	−10	−19	13	25			
21. Progress of Disease	15	15	19	06	40*	24	15	−40	−45	−39	−60	−15	−09	−42	08	17	−23	−49	−30	−17		
22. Age of Child	74	75	80	−20	−21	−03	08	−68	−68	−29	−23	−27	−26	−35	27	−10	12	−04	−11	−20	33**	

NOTE.—The variables "disease," "faith," and "prognosis" were not suitable for computation with an N as small as 20. * Significant at .05 level. ** Significant at .01 level.

were sharply concerned over the illness enabled the wives to be relieved of some anxiety and to function better in the ward situation.[3] Lastly, the fathers' stories on the TAT seemed to be more a function of their relationship to their wives than of the illness of the child. Where the "parent-parent relationship" was good, their stories had a happy "outcome," whereas the "outcome" of the stories told by mothers showed an insignificant relationship to the strength of the "parent-parent relationship." Apparently the fathers' expectation of happiness, as measured by the TAT, was less dependent on the health of their children than was the case for the mothers.

A *t* test for differences between means also was made for each of the 25 variables between fathers and mothers (Table 4). The mothers were found to have somewhat stronger pro-religious attitudes than did the fathers. These attitudes, however, were in no way related to any other variable and therefore seem to have played little part in this study.

Differences between Parents of Leukemic and Nonleukemic Children

The total group was split into two groups of parents of leukemic and nonleukemic children. Each group consisted of 20 parents (10 male, 10 female). The correlations were compiled and compared for significant differences as shown in Tables 5 and 6. To test for differences between the means, *t* tests for each variable also were computed as indicated in Table 7.

Although the difficulty in obtaining subjects due to the limited facilities at the hospital did not make it possible to match the groups, they were actually matched through the system of choosing as subjects any eligible parents who entered the hospital. Only two out of 22 couples refused to participate, so that the bias effect was slight. Supporting this statement is the fact that Table 7 shows that the groups did not differ significantly in such variables as "age," "years married," "education," "occupation," and "information received." Hence, it seems possible to conclude that the many differences found between correlation matrices for leukemic parents and nonleukemic parents (Tables 5 and 6) were caused by the disease process. This finding is somewhat unexpected in that many of the nonleukemic cancers are themselves often fatal and require a great deal of adjustment on the part of the parents. Even the parents of the two patients in the nonleukemic group eventually found not to have cancer did not know this fact at the time of the testing.

The only clear "psychological" difference between the groups as computed by the *t* test for differences between means (Table 7) was for the "emotional tone" of stories told to the TAT. The nonleukemic parents (hereafter called NL parents) told fewer unhappy stories than the leukemic parents (hereafter called L parents), though the groups did not differ in the "outcome" of their stories. Hence, the general mood of the stories

[3] The author wishes to express his thanks to Dr. Beatrix Cobb for suggesting this interpretation to him.

TABLE 7

DIFFERENCES BETWEEN MEAN RATINGS FOR PARENTS OF LEUKEMIC CHILDREN AND PARENTS OF NONLEUKEMIC CHILDREN
(For ratings, higher score has more positive value.)

Variable	MEAN		*t*
	Leukemic Parents	*Nonleukemic Parents*	
Age of Parent	34.1	32.6	.60
Number of Years Married	11.1	10.4	.31
Number of Children	2.1	2.6	1.35
Education	3.0	3.4	.73
Church Attendance	3.1	2.2	1.86
Father's Occupation	4.6	4.7	.15
Amount of Medical Payment	1.2	1.5	.88
Information Received	3.2	3.2	.00
Discussion of Disease	2.7	3.4	1.70
Emotional Adjustment	2.6	3.1	1.29
Intellectual Understanding	2.4	2.7	1.06
Parent-Child Relationship	1.9	2.3	1.54
Adjustment to Hospital Routine	2.2	2.2	.19
Parent-Parent Relationship	2.1	2.4	1.04
Taylor Anxiety Scale	13.7	14.0	.01
Religious Attitude Score	76.9	76.5	.19
TAT Emotional Tone	27.1	29.9	2.80**
TAT Outcome	36.4	37.0	.32
TAT Tone–Outcome Difference	9.3	7.1	1.30
TAT Approach	64.1	65.2	.40
Age of Child	4.3	7.3	4.69**
Progress of Child	44.6	60.0	1.84

** Significant at .01 level.

probably reflected the actual emotional state of the parents more than the superficially tacked on "happy ending."

While no single variable regarding emotional adjustment to the disease was clearly significant, the general trend when considering the variables as a whole seemed to show that the NL parents were able to relate better to their children, spouses, and to the hospital routine than were the L parents.

Turning to the correlation matrices for the leukemic and nonleukemic population (Tables 5 and 6), it may be observed that personal relationships between husband and wife and parent and child determined "adjustment to the hospital" and "emotional adjustment to the disease" more for the L parents than for the NL parents.

The amount of money paid for hospitalization aside from insurance coverage seemed to differentiate the L parents from the NL parents in

several ways. "Church attendance," "religious attitude," and the "tone" of TAT stories were all inversely related to the amount of money paid by the L parents and positively related to the payments of the NL parents. It may be that the payments served as a substitute for religious faith for the L parents in terms of influencing the outcome of the disease.

The "amount of payment" also correlated positively with "information," "discussion," "intellectual understanding of the disease," "emotional adjustment," and "adjustment to the hospital routine" for the L parents, but negatively for the NL parents. These correlations may signify that, up to a certain point, the more money one has to pay for an illness the more alarmed one gets (nonleukemic diseases), but, if one knows that the illness is an extremely dread disease (leukemia), then the more one pays the more one might hope that everything possible will be done for one's child.

"Education" played a differentiating role in that it correlated positively with "discussion of the disease" and "emotional adjustment" for the L parents, but did not do so for the NL parents. One may hypothesize that "education" may be useful as an emotional adjunct only when a disease is fatal, in that in understanding the disease some emotional balm occurs. "Education" may not be so useful in a situation where the prognosis is uncertain as was the case for many of the NL children.

The "tone" of the TAT stories was negatively related to "education" and "intellectual understanding" for the L parents, showing that these variables seemed to reflect a realistic understanding of leukemia. The "tone" was positively related to "education" and "intellectual understanding" for the NL parents. Thus, the stories reflected the hope of the more educated that uncertainty of prognosis for the NL children was a cause for some optimism.

In addition, "TAT outcome" correlated negatively with "parent-parent relationship" for L parents, but positively for NL parents. Seemingly, a good relationship enabled the L parents to face the fatal outcome of the disease realistically (negative "outcome") and helped the NL parents to maintain hope where there was some justification for it (positive "outcome").

The "amount of information" given and "discussion" between the physician and NL parents were inversely related to the number of years the parents had been married, as well as the number of children they had. For the L parents no relationship existed for these variables. Ostensibly, the physicians felt that for nonleukemic disease the parents would need less information from them if they were "old hands" at children's diseases.

What effect did the giving of information and subsequent discussion between physician and patient have upon the emotional adjustment of the parents? The results are exceedingly clear. *The more information given and discussion occurring, the better the emotional adjustment of the NL parents and the poorer the emotional adjustment of the L parents.* The L parents may have lost hope when with increasing information it became

apparent that the outcome of the disease appeared inevitably fatal. The NL parents may have been reassured by the physician making it clear that in their case quite often the outcome was uncertain. The effect of higher socioeconomic status favored emotional adjustment on the part of the L parents and decreased emotional adjustment for the NL parents. Perhaps, the "upper strata" thought that research might find a cure for leukemia, and that uncertainty in the nonleukemias was not necessarily a hopeful sign. Accordingly, "intellectual understanding of the disease" correlated higher with "emotional adjustment" for the L parents than for the NL parents. With "intellectual understanding," the "tone" and "outcome" of the TAT stories reflected pessimism for the L parents and hope for the NL parents.

In the area of interpersonal relationships, consistent with the previous statements, the "parent-child relationship" seemed poorer for the L parents where considerable "discussion of the disease" had taken place with the physician and somewhat better as a result of "discussion" for the NL parents. Although both L and NL parents showed high correlations between their "relationship to their child" and "adjustment to the hospital routine," this correlation was significantly higher for L parents.

Discussion

The finding that emotional adjustment was a function of education and socioeconomic status is not unique to this study. Baldwin *et al.* (1) reported in a study of the educational levels found in various types of homes that democratic (more emotionally mature) attitudes were found more frequently in homes where the educational level of the parents was high, while in homes where educational level was low the parents exhibited either passive-neglectful or actively hostile attitudes towards their children. It would seem, therefore, that hospital personnel ought to consider this factor of education in estimating the amount of help the parents will need in adjusting to their child's disease.

Another finding was that, as might be expected, emotional adjustment was poorer for L parents than for NL parents. Also noted was the fact that the parents' interpersonal relationships were more closely related to emotional adjustment for parents of leukemic children than was the case for parents of nonleukemic ones. It might be of benefit, therefore, for psychologists and psychiatrists working with such patients to attempt to strengthen marital relationships through counseling and to be alert to the negative implication of marital disharmony for emotional adjustment to the disease.

Further, it appears that no universal panacea exists for the old problem, "Is a little knowledge a dangerous thing?" The meaning of the fact that a plethora of information resulted in poorer emotional adjustment on the part of parents of leukemic children is perhaps that when a prognosis is explained as exceedingly poor, little is gained by adding the little details.

On the other hand, when a prognosis is in doubt, as was the case with many of the nonleukemic patients, increasing the flow of information to the parents helps them to become aware of the fact that a legitimate basis for hope exists. Consequently, a *cartes sur table* approach with parents may be beneficial only if the means exist for alleviating or improving a deleterious situation. If no real basis for optimism exists, one rubs salt into already raw wounds in giving a full professional description of each phase of the disease.

The value of the TAT was found to be chiefly that of reflecting the prevailing mood of the parent through the emotional tone of his stories. The outcome of the TAT stories was of no significance in differentiating between leukemia and nonleukemia parents. No one has as yet demonstrated the oft-claimed ability of the TAT to probe unconscious depths. Indeed, in view of the fact that stories are heavily influenced by the stimulus properties of the cards (4), it would be wise to observe the stories of normal parents before assuming that the stories might differentiate parents of normal children from those of leukemic ones, as had been claimed in an earlier study (5).

In closing, a few cautions must be expressed. First, because of the vast number of correlations and significance tests made, it is to be expected that some of the correlations, despite their size, have arisen by chance. Since no hypotheses were advanced as to what relationships would be significant, one has to tread cautiously in drawing conclusions. Secondly, some of the correlations are biased because the same rater had his ratings appear on more than one variable: It is preferable to have different judges for each variable, but unfortunately not always practical.

In sum, this study was exploratory. The hope of the author was to provide sufficient data so that future research could digest the findings, formulate more specific hypotheses, and, by replication and more extensive work, separate the wheat from the chaff.

Summary

The emotional adjustment of mothers and fathers of children having leukemia were compared to the adjustment of parents of children having some other type of tumor growth requiring extensive hospitalization. The actuarial data included age of patient, mother, father; number of children in family; number of years parents had been married; education of father, mother; religious faith of father, mother; frequency of church attendance for father, mother; disease of the child; occupation of the father; extent of payment for medical care. Two pediatricians rated the amount of information given to the parents, the amount of discussion about the disease, the emotional adjustment of the parents, and their intellectual understanding of the disease. The nurses rated the parents' relationship to each other, to the child, and the parents' adjustment to the hospital routine. Psychological

measures obtained included the Taylor Manifest Anxiety Scale, the Texas Religious Attitude Scale, and several scores derived from an analysis of the TAT stories.

The results indicated the importance of cognitive and socioeconomic factors in adjustment to the disease. There was little difference between the adjustment of fathers and mothers. Interpersonal relationships played a stronger role in determining adjustment for the leukemias than for the other diseases. The effect of extensive communication from the physician to the parent concerning the nature of the disease was negative with regard to the emotional adjustment of parents of leukemic children and more positive for parents of nonleukemic children. The implications of these findings were discussed.

References

1. Baldwin, A. L., Kalhorn, J., & Breese, F. H. Patterns of parent behavior. *Psychol. Monogr.*, 1945, 58, No. 268.
2. Bozeman, Mary F., Orbach, C. E., & Sutherland, A. M. Psychological impact of cancer and its treatment. III. The adaptation of mothers to the threatened loss of their children through leukemia: Part I. *Cancer*, 1955, 8, 1-19.
3. Eron, L. D. A normative study of the Thematic Apperception Test. *Psychol. Monogr.*, 1950, 64, No. 9 (Whole No. 315).
4. Murstein, B. I. Non-projective determinants of perception on the TAT. *J. consult. Psychol.*, 1958, 22, 195-198.
5. Orbach, C. E., Sutherland, A. M., & Bozeman, Mary F. Psychological impact of cancer and its treatment. III. The adaptation of mothers to the threatened loss of their children through leukemia. Part II. *Cancer*, 1955, 8, 20-33.

DEVELOPMENTAL MATURITY AS A DETERMINANT IN PRESTIGE OF ADOLESCENT GIRLS[1]

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The factors involved in gaining and maintaining prestige during adolescence are still obscure, despite the numerous investigations which have sought to define them. Of the physical characteristics which have been studied in relation to prestige, level of maturity consistently has been found to be significant for boys (6, 8, 10). It has been clearly established that early-maturing boys command an advantage in social relations, not only during adolescence (2, 10), but in the later years of life, as well (13). The gains in strength and physical ability which accompany puberty (6, 7, 15) provide an advantage for the early-maturing boy in at least one important avenue for gaining prestige, i.e., athletics (6, 17, 18).

For girls, however, the relation between developmental maturity and prestige is less evident and has not been clearly established. While early maturing provides no obvious prestige-gaining advantage for girls (such as competence in athletics brings for boys), it seems reasonable to expect that the rate and timing of physical changes at adolescence would have significant concomitants in the behavior and reputations of adolescent girls (4, 16). One means of determining whether early puberty, with its concomitants, is advantageous or deleterious to the social status of girls would be to analyze Guess Who reputations of adolescent girls in terms of the girls' level of physical development during adolescence.

It is the purpose of the present research to determine for girls whether developmental maturity is a determinant in prestige during adolescence. The study is an extension of Tryon's *Evaluations of Adolescent Personality*

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[1] A paper reporting a portion of this research was presented at the 1957 meetings of the American Psychological Association. The paper and article are based upon a dissertation submitted in partial fulfillment of the Ph.D. requirements at Stanford University. The author is grateful to Dr. Lois Meek Stolz, chairman of this dissertation committee, for her continued interest and help in the research.

[2] At the Department of Child Study, Vassar College, 1959-1960.

Child Develpm., 1960, 31, 173-184.

by Adolescents (17), in which she noted differences between 12-year-old and 15-year-old boys and girls in their evaluation of traits with respect to prestige. In the present study of adolescent girls four consecutive grades have been included in the analysis in order to see more clearly the relationship between developmental maturity and the evaluations of prestige and other traits during this phase of adolescence. The period from the sixth to the ninth grades is generally a time of rapid physical changes for girls, and it might be expected that developmental differences among girls would be systematically associated with certain trait scores of the Guess Who test. Some traits or reputations might be ascribed characteristically to the more mature rather than to the less mature girls. On the other hand, it is possible that, as the level of maturity of the girls changes from one grade to the next, their evaluations of traits and of developmental maturity may undergo progressive changes as well. In order to see more clearly the changing relationship between developmental maturity and the reputations of adolescent girls, the present analysis is undertaken for each grade separately. This may help to clarify the meaning which early and late development has for girls at various times during the adolescent period.

Subjects

The subjects were 731 girls enrolled in the sixth, seventh, eighth, and ninth grades in a suburban school community.[3] Girls in the three upper grades attended junior high school, while the sixth graders attended various elementary schools, all of which were within the junior high school attendance area. The population represents roughly 96 per cent of the girls enrolled in the classes selected for the study.

Procedure

The test used in this investigation was a duplication of the Guess Who test which Tryon (17) employed, with the addition of the following pair of items, which were designed to measure prestige:

> Here is someone whom everyone thinks a lot of, who influences the group. What he (or she) says or does is important to the group.
>
> Here is someone whom no one thinks much of; what he (or she) says or does matters little to the group.

The Guess Who test, comprised of 21 pairs of trait descriptions, was administered in the natural classroom setting to both boys and girls, although only the scores of the girls were analyzed for the present purpose.

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[3] The author is deeply grateful to Supt. Norman O. Tallman and to school principals Messrs. Wood, Post, Niedermeyer, and Wise of the Montebello (California) Unified School District for their cooperation in this research.

Following Tryon's procedure, the sixth graders were instructed to mention on the test anyone within their classroom, while in the three junior high school grades the pupils were instructed to mention anyone within their whole grade.[4]

Scoring the Guess Who Test

For every girl the number of mentions received on the positive and the negative item of each trait pair was summed algebraically, following Tryon's procedure. A score of zero was assigned to anyone who was mentioned on neither item of a trait pair or who received an equal number of positive and negative mentions. Self-mentions were excluded.

For the sixth grade girls each score was expressed as a proportion of the number of mentions received relative to the number of possible mentions (girls in the class). This gave scores which were comparable among the seven sixth grade classes, which varied considerably in size.

Scoring Developmental Maturity

Developmental maturity was assessed by means of menarcheal age scores, the data for which were obtained by the school nurses for the sixth grade girls and by the women's physical education staff for the three junior high school grades. The data were obtained at a time when the girls were in a health class or physical education class separate from the boys, and when it would seem very natural for the staff to obtain such developmental data.

TABLE 1

CLASSIFICATION INTO DEVELOPMENTAL GROUPS

Grade	*Prepuberal*	*Puberal*	*Postpuberal*	*Late Adolescent*	*Total*
Sixth	96	29	5	0	130
Seventh	66	99	53	3	221
Eighth	17	45	104	27	193
Ninth	4	16	106	61	187
Total	183	189	268	91	731

Subsequently, the girls were classified into four developmental groups. Girls who had not reached menarche were considered "Prepuberal," while girls who had reached menarche within a year of the time of testing were classified "Puberal." Girls who had reached menarche more than one year and less than three years prior to the testing were called "Postpuberal." All others were considered "Late Adolescent." The distribution of girls in each developmental group is given in Table 1 for the four grades.

[4] See Faust (3) for detailed description of administration, tabulation, and scoring procedures.

Analysis of Data

Pearson product-moment correlations between *prestige* and each of the other Guess Who traits were computed for each of the four grades separately, and the findings are presented in Table 2. The close correspondence between Tryon's prestige-lending traits and the traits yielding the highest correlations with *prestige* by the present method is discussed elsewhere (3).

TABLE 2

CORRELATIONS BETWEEN PRESTIGE AND OTHER GUESS WHO TRAITS WITHIN EACH GRADE

	Sixth $N=130$	*Seventh* $N=221$	*Eighth* $N=193$	*Ninth* $N=187$
Restless	—.42**	—.31**	—.15*	—.12
Talkative	—.01	.08	.15*	.05
Active-Games	.18*	.27**	.42**	.34**
Humor-Jokes	.23**	.34**	.29**	.35**
Friendly	.68**	.73**	.68**	.68**
Leader	.48**	.46**	.67**	.63**
Fights	—.27**	—.15*	—.10	—.05
Assured-Class	.43**	.33**	.55**	.34**
Daring	.47**	.39**	.41**	.50**
Tidy	.57**	.48**	.48**	.35**
Older Friends	.20*	.17*	.27**	.05
Humor-Self	.35**	.35**	.75**	.59**
Grown-up	.33**	.25**	.19**	.20**
Attention-getting	—.23**	—.09	—.18*	—.33**
Assured-Adults	.57**	.41**	.45**	.48**
Popular	.68**	.80**	.93**	.82**
Happy	.43**	.62**	.67**	.58**
Good-looking	.65**	.42**	.42**	.54**
Enthusiastic	.65**	.56**	.67**	.61**
Bossy	.15	—.01	—.03	—.12

* Significant at .05 level.
** Significant at .01 level.

Before testing whether Guess Who scores were a function of developmental maturity, it was necessary to ascertain whether the various developmental groups within each grade were of comparable CA. Analysis of variance revealed that, at each grade, the developmentally more mature girls were significantly older than the less mature girls. Therefore, it became necessary to determine whether CA differences within a grade were related to Guess Who test scores. Twenty-one correlations between CA and Guess Who scores were computed for each grade. Of these 84 correlations, only one reached significance at the .05 level of confidence, and one is fewer

than would be expected on a chance basis alone! Therefore it was unnecessary to use a covariance method of holding CA constant while analyzing the effect of developmental maturity upon Guess Who scores, since CA differences within a grade were found to be unrelated to trait scores. Thereupon, an analysis of variance (12, p. 261 ff.) was conducted for each grade to determine whether any given trait was more closely associated with one level of development than with another. Some developmental groups in certain grades were not large enough to warrant their inclusion in the statistical analysis (*see* Table 1). Table 3 shows the mean scores of developmental groups on the Guess Who items upon which significant differences among the developmental groups were revealed by this analysis.

TABLE 3

AVERAGE SCORE FOR INDIVIDUALS ON ITEMS WHICH DIFFERENTIATED SIGNIFICANTLY AMONG THE DEVELOPMENTAL GROUPS

	Prepuberal	*Puberal*	*Postpuberal*	*Late Adolescent*	*p*
Grown-up					
Sixth	0.1	4.3	*	*	.05
Seventh	—1.1	0.4	1.2	*	.001
Eighth	—2.0	—1.1	0.5	2.2	.001
Ninth	*	—0.8	0.2	0.8	.01
Older Friends					
Seventh	0.0	0.8	1.4	*	.001
Eighth	—0.2	0.4	0.9	2.6	.001
Daring					
Ninth	*	—0.2	0.7	0.6	.01

* Group not large enough to be included in the analysis.

RESULTS

At every grade the more mature girls received progressively higher mean scores on the item *grown-up* than did their less mature classmates. Similarly, on the item *older friends* consistent differences among the developmental groups were observed at each grade, although only in the seventh and eighth grades did the differences reach statistical significance. While CA differences within a grade were unrelated to trait scores, developmental differences significantly affected the opinions which girls had of their peers on these traits.

On the other hand, the differences among developmental groups on the trait *daring* reached the .01 level in the ninth grade only. Since the differences on the trait *daring* were significant only in this grade and since they

do not reflect a consistent trend in mean scores for the developmental groups, it is difficult to determine whether or not the differences might have resulted from chance alone.

Differences in mean scores among developmental groups were not great enough to reach significance on the other traits. However, the differences in mean scores for developmental groups on many of the items followed a consistent pattern within each grade. A consideration of the mean scores of developmental groups on the prestige-lending traits alone (*see* Table 2) suggests that level of development had some effect upon Guess Who evaluations. Considering only the item *prestige* and the items correlated significantly with *prestige*, it is apparent that one developmental group at each grade received more than a chance allotment of high scores on these favorable traits. At each grade the developmental group which received the highest mean score on *prestige* tended to receive high scores also on the items which correlated positively with *prestige* and to receive low scores on the items which were negatively correlated with *prestige* for that grade.

TABLE 4

DISTRIBUTION OF FAVORABLE SCORES ON PRESTIGE-LENDING TRAITS FOR DEVELOPMENTAL GROUPS IN EACH GRADE

Grade	*No. of Traits Significantly Correlated with* PRESTIGE	*Prepuberal*	*Puberal*	*Postpuberal*	*Late Adolescent*	*p*
Sixth	18	15	3	*	*	.003
Seventh	17	4	3½	9½	*	.035
Eighth	18	1	3	1	13	.00003
Ninth	15	*	1½	5½	8	.05

NOTE.—When two developmental groups received the same high mean score, each was given credit for one-half.

* Group not large enough to be included in the analysis.

By means of the binomial test it was determined that at each grade one developmental group was attributed more of the prestige-related traits than was a likely occurrence on the basis of chance (*see* Table 4). For the three junior high school grades the most mature groups consistently received the highest mean scores on *prestige* and on items significantly correlated with it, such as *popular, friendly,* and *assured-adults.* While girls in the later stages of development were favored during the junior high school years, this was not the case for the sixth grade girls. Instead, the least mature girls, the prepuberal group, received favorable scores on most of the desirable traits in the sixth grade.

In the sixth grade a prepuberal girl is developmentally "in phase" with the majority of her classmates, and being at the prepuberal stage of develop-

ment seems to be an asset in prestige in sixth grade. However, in the seventh grade the average girl is in the puberal group (*see* Table 1); yet the prestige-lending traits are most frequently ascribed to the postpuberal girls. In both eighth and ninth grades, when the average girl is in the postpuberal group, the desirable traits are most frequently ascribed to girls in the late adolescent group (four to six years beyond menarche).

Discussion

A girl's level of physical maturity is not the only determinant in her scores on the Guess Who items, but, together with associated emotional, social, sexual, and personality changes, level of maturity does contribute significantly to the reputation which a girl has in her social group. Although puberal development contributes only a small amount of variance to the Guess Who trait scores, it does seem to contribute enough to give slight but consistent direction to the mean trait scores.

Adolescents' awareness of developmental differences is clearly revealed in their evaluations on certain Guess Who traits. While CA bore no significant relation to scores on the items *grown-up* and *older friends,* at every grade the more mature girls received progressively higher mean scores than did their less mature classmates on these items. Thus, developmental differences were more significant than CA differences in affecting these scores. It is evident that the more mature girls are taller, on the average (14), and that they appear more "grown-up" in terms of secondary sex characteristics (5). These associated factors of development may be the basis for the girls' evaluations on the trait *grown-up*. The possible relation of developmental maturity to the scores on *older friends* is likewise evident. For the more mature girls to seek out comparably mature girl friends of a higher grade in school is reasonable and is consistent with Jones' finding (9) that level of maturity is a factor in friendship selection. In addition, level of development is related to maturity of interests and activities (16), and common interests are known to be important in establishing friendships (1). The evaluations on the trait *older friends* may indicate, on the other hand, that the more mature girls are judged as having boy friends in a higher grade in school. Since the boys of a given grade mature later than the girls, the girls of advanced physical maturity may find satisfaction of their heterosexual interest in dating older boys. However, by ninth grade, associating with older friends is no longer judged as being prestige-lending ($r = .05$). Perhaps, as the discrepancy in physical maturity between boys and girls diminishes, the prestige-lending nature of dating older boys is concomitantly reduced to insignificance.

According to Jones and Bayley (10), the traits *grown-up* and *older friends* were two of the Guess Who items upon which the early- and the late-maturing boys received significantly different scores. Consistently on six testings throughout the adolescent period the group of late-maturing

boys were seen as less "grown-up" and less likely to have "older friends" than were the early-maturing boys. These findings correspond with those found here among the girls: *grown-up* and *older friends* were characteristic of the more mature girls at each grade.

Although the scores of physically immature boys and girls are similar on these two traits, their scores on the other Guess Who traits show a marked sex difference. Jones and Bayley (10) report that the late-maturing boys received above average scores on *attention getting, restless, assured-class,* and *talkative,* while the evidence from the present study is that the less mature girls *in junior high school* were characterized by the traits *non-attention getting, quiet,* and *avoids fights.* According to Jones and Bayley, boys seem to defend themselves against the anxieties of late development by compensation for inferiority, expressed in attention-getting mannerisms. However, for girls the defense against immature physical status in junior high school seems to be more of a withdrawal and an attempt to be inconspicuous in the group. Both of these patterns seem to represent a perseveration of certain components of the respective, sex-appropriate, preadolescent pattern, which was prestige-lending for neither boys nor girls at this level.

The findings of this study suggest that for girls level of development is a factor in the assignment of traits during adolesecence. Although the single trait *prestige* is not significantly associated with level of physical maturity, the high scores on this item are consistent with the pattern of high scores on the other desirable traits; i.e., one developmental group at each grade received more of the favorable scores than would be expected on a chance basis. When all of the prestige-lending traits of a given grade are considered as a whole, it appears that prestige is more likely to surround those in the sixth grade who are developmentally "in phase" (prepuberal), whereas during the junior high school years being ahead of the group developmentally seems to be an advantage. While prepuberal status may be hazardous for girls in junior high school, it is not considered "immature" nor undesirable in sixth grade. A prepuberal girl in sixth grade is developmentally "in phase" with the great majority of her classmates, while a prepuberal girl in ninth grade is a "developmental isolate." A girl's level of physical maturity is not only relative to the development of others in the class, but it is seen against a background of developmental differences within the whole school. Being at the prepuberal level of development seems to lend different qualities to the composite picture of an individual in elementary school than it does to one in the junior high school grades.

Although the evaluations of traits in relation to *prestige* were much the same for sixth and for seventh grade girls (rho = .90), the actual traits were attributed to a developmentally different group of girls. In the one year from sixth to seventh grade, the prestige-lending qualities shift from the prepuberal to the postpuberal girls, a developmental difference of two to three years. Moreover, in the eighth and ninth grades it is the late adolescent group, girls from four to six years beyond menarche, who are at

the favored developmental level. This discontinuity between rate of developmental change and rate of change in prestige-lending evaluations suggests that a girl who is prepuberal in sixth grade cannot remain in the favored developmental position in junior high school, because her level of maturity cannot keep pace with the *rate* at which peer evaluations change with respect to developmental maturity.

This discontinuity suggests that for girls neither physical acceleration nor physical retardation is consistently advantageous. It is not until the junior high school years that the early-maturing girl "comes into her own" and reaps the benefit of her accelerated development. Until that time her precocious development is somewhat detrimental to her social status. The adjustments which inevitably must be made to losses and gains in status during the adolescent period (18) may be partly a function of this discontinuity in the relationship between developmental maturity and prestige during the adolescent period. Tryon alluded to this discontinuity and its significance when she described Case 29 (17), a girl who commanded prestige at 12 years of age, but who at age 14 or 15 was still developmentally immature. Tryon noted that in the ninth grade "she is now one of the very few little girls; she seemed like a child in the midst of adults with a group of girls; tended to avoid large mixed groups of boys and girls and their activities" (p. 64). The emotional hazard of losing status during adolescence because of relative physical immaturity is not infrequently noted in case studies and observed in child guidance clinics. Contrariwise, as the findings of this study suggest, precocious physical maturity may possess its hazards, particularly in the period before entrance to junior high school.

After the transition to junior high school, girls begin to ascribe prestige to classmates who have been physically mature for a longer period of time and to girls whose interests and activities are undoubtedly more advanced. Perhaps these more mature girls satisfy a requirement for prestige in the group because of their "advanced standing" with respect to the new developmental tasks which the less mature girls are facing.

The significance of the present research is in its clarification of the changing relationship between developmental maturity and social prestige during adolescence. The findings of this study do not support Jones' assertion that "the very early maturing girl . . . is in many respects in a disadvantageous position" (8). From an unpublished study arising from the Adolescent Growth Study, Jones states that "*when we compared them* (italics the writer's) . . . we found that the early-maturing (girls) were below average in prestige, sociability, and leadership; below average in popularity; below average in cheerfulness, poise, and expressiveness." Perhaps the discrepancy between the present study and the one which Jones reports lies in the phrase "when we compared them," for it is apparent that the present findings for *sixth* grade girls are not unlike the H. Jones quotation. However, the present findings indicate that early-maturing is indeed advantageous in all

three junior high school grades. By junior high school accelerated development has taken on a prestige-lending connotation. The favorable position of the early-developing girl is generally consistent with other of the California Growth Study findings, although not with the citation above of H. Jones. M. C. Jones and Mussen (11) report: "Although the differences were not consistent in all categories, the early-maturing girls tended to score more favorably than the slow-maturing on 'total adjustment,' and also on family adjustment and feelings of personal adequacy. These data from the self-report inventory seem to be generally consistent with the findings from the TAT" (p. 497).

The findings of the present research point out the complex nature of variables which interact in producing a girl's reputation during adolescence. The data support the hypothesis by Jones and Mussen (11) that early and late development may mean different things at different times during adolescence. The discontinuity between rate of change in evaluations of prestige and rate of physical changes during adolescence means that, for girls, accelerated development is not a sustained asset throughout the adolescent period, as it is for boys. Accelerated development for girls is somewhat detrimental to prestige status before the junior high school years, while it places a girl in a very favorable social position throughout the junior high school years.

Summary

The purpose of the present study was to ascertain for girls whether level of physical maturity is a determinant in prestige during adolescence. Tryon's Guess Who test, including an additional pair of items designed to measure prestige, was administered to 731 girls in the sixth, seventh, eighth, and ninth grades. Correlations between prestige and the other 20 traits were computed for each grade separately, and the correlations were tested for significance.

Level of physical maturity was assessed by means of menarcheal age scores, which were obtained by the school nurses for the sixth grade girls and by the women's physical education staff for the three junior high school grades. On the basis of the menarcheal age data girls at each grade were classified into four developmental groups.

In order to determine whether CA differences within a grade were related to Guess Who scores, correlations between CA and each of the 21 Guess Who traits were computed for each grade. No significant relation was found between CA differences within a grade and Guess Who trait scores.

An analysis of variance based upon developmental groups revealed that the developmentally more mature girls at each grade received significantly higher scores on the items *grown-up* and *older friends* than did their less mature classmates. Differences in mean scores among developmental groups

were not great enough to reach significance on the other traits. However, one developmental group at each grade received the highest scores on more of the prestige-related traits than would be expected on the basis of chance. By means of the binomial test, it was determined that *prestige* and the significant prestige-related traits were more frequently ascribed to sixth grade girls who were developmentally "in phase" (prepuberal), while in all three junior high school grades girls who were physically accelerated and were in the most mature developmental groups received more of the favorable reputation scores. Thus, for girls precocious physical development tends to be a detriment in prestige status during sixth grade, while it tends to become a decided asset during the three succeeding years.

The findings indicate that level of development is not a single factor in determining a girl's status in the group, but it is an important part of a composite of factors in creating a girl's reputation during adolescence. A discrepancy between rate of developmental change and rate of change in prestige-lending evaluations during adolescence was noted and was interpreted in terms of the different meaning which early and late development have for girls at different times during adolescence. After the transition to junior high school, the more favorable reputation scores were ascribed to the physically accelerated girls.

References

1. Bonney, M. E. A sociometric study of the relationship of some factors to mutual friendships in the elementary, secondary, and college levels. *Sociometry*, 1946, 9, 21-47.
2. Bower, P. A. The relation of physical, mental, and personality factors to popularity in adolescent boys. Unpublished doctoral dissertation, Univer. of California, Berkeley, 1941.
3. Faust, Margaret S. Developmental maturity as a determinant in prestige of adolescent girls. Unpublished doctoral dissertation, Stanford Univer., 1957.
4. Frank, L. K. Personality development in adolescent girls. *Monogr. Soc. Res. Child Develpm.*, 1953, 16, No. 53.
5. Greulich, W. W. Physical changes in adolescence. *Yearb. nat. Soc. Stud. Educ.*, 1944, 43(I), 8-32.
6. Jones, H. E. *Development in adolescence*. New York: Appleton-Century-Crofts, 1943.
7. Jones, H. E. *Motor performance and growth*. Berkeley: Univer. of California Press, 1949.
8. Jones, H. E. Adolescence in our society. In *The family in a democratic society: anniversary papers of The Community Service Society of New York*. New York: Columbia Univer. Press, 1949. Pp. 70-82.

9. JONES, MARY C. Adolescent friendships. *Amer. Psychologist,* 1948, 3, 352. (Abstract)

10. JONES, MARY C., & BAYLEY, NANCY. Physical maturing among boys as related to behavior. *J. educ. Psychol.,* 1950, 41, 129-148.

11. JONES, MARY C., & MUSSEN, P. H. Self-conceptions, motivations, and interpersonal attitudes of early- and late-maturing girls. *Child Develpm.,* 1958, 29, 491-501.

12. MCNEMAR, Q. *Psychological statistics.* New York: Wiley, 1955.

13. MUSSEN, P. H., & JONES, MARY C. Self-conceptions, motivations, and interpersonal attitudes of late- and early-maturing boys. *Child Develpm.,* 1957, 28, 243-256.

14. SHUTTLEWORTH, F. K. Sexual maturation and physical growth of girls age six to nineteen. *Monogr. Soc. Res. Child Develpm.,* 1937, 2, No. 5.

15. STOLZ, H. R., & STOLZ, LOIS M. *Somatic development of adolescent boys.* New York: Macmillan, 1951.

16. STONE, C. P., & BARKER, R. G. The attitudes and interests of premenarcheal and postmenarcheal girls. *J. gent. Psychol.,* 1939, 54, 27-71.

17. TRYON, CAROLINE. Evaluations of adolescent personality by adolescents. *Monogr. Soc. Res. Child Develpm.,* 1939, 4, No. 23.

18. TRYON, CAROLINE. The adolescent peer culture. *Yearb. nat. Soc. Study Educ.,* 1944, 43(I), 217-239.

ERRATUM

On page 357 of September, 1959, issue ("An Experimental Investigation of Parent-Child Attitudes with the PARI Scales" by Donald K. Freedheim and Wally Reichenberg-Hackett), the legend for column A in Figure 1 is incorrect. The solid line represents Staff; the broken line, Nurses' Aides. The interpretation in the text is correct.

Proceedings of the Twenty-Fifth Anniversary Meeting *of the* Society for Research in Child Development

The Society for Research in Child Development held its Twenty-Fifth Anniversary Meeting at the Clinical Center of the National Institutes of Health, Bethesda, Maryland, on March 19-21, 1959. Charter members and past presidents of the Society were honored guests. The program included forty-one papers, five symposia, a series of reports on current research relating to children at the National Institutes of Health, and an invited address by Lawrence K. Frank, entitled "Future Possibilities in Child Development Research." Joseph M. Bobbitt, Assistant Director of the National Institute of Mental Health, opened the meeting.

The Program and Local Arrangements Committee consisted of Nancy Bayley, Chairman, Richard Q. Bell, Leonard Carmichael, Marian M. Crane, Jacob L. Gewirtz, James L. Hymes, Jr., Carroll E. Palmer, Harriet L. Rheingold, and Earl S. Schaefer.

W. M. Krogman was named President (1959-1961), and Nancy Bayley, President-Elect. Elected to the Governing Council were Leona M. Bayer (1959-1965), Urie Bronfenbrenner (1959-1965), Orville G. Brim, Jr. (1959-1961), Frank Falkner (1959-1961), and Mary Ellen Goodman (1959-1961). Continuing members of the Council are Roger Barker (1957-1961), Lois Meek Stolz (1955-1961), and Dale B. Harris (1957-1961), also serving as Secretary.

Child Develpm., 1960, 31, 187-239.

Program [1]

INVITED ADDRESS

FUTURE POSSIBILITIES IN CHILD DEVELOPMENT RESEARCH

LAWRENCE K. FRANK
Belmont, Massachusetts

Since the human organism is what Warren Weaver (5) has called an "organized complexity," it will be necessary to develop new concepts and new methods appropriate for the study of organized complexities which, as Weaver has pointed out, cannot be approached in terms of the classical techniques for the study of two variables, nor by the new methods of probability applicable to innumerable variables.

Norbert Wiener (6) has formulated the conception of cybernetics, involving feedbacks and feedforwards and offering a rigorous basis for the study of purposive behavior (4). Wiener has also pointed out the importance of recognizing and studying patterns and configurations and has indicated the importance of temporal complexity as contrasted with spatial complexity. In information and communication theory, possibilities are offered for new conceptual models that depart from the classical concern with the transmission and transformation of energy and focus instead upon signals or messages which trigger or evoke activities. This offers a possibility of escape from the classical formulation of cause and effect, and stimulus and response. It makes possible the study of processes as contrasted with mechanisms (3).

If, with these leads, we undertake the study of human growth, development, and aging, our problem becomes that of discovering how the organism-personality persists while changing, maintains a dynamic stability, with self-correcting and self-repairing processes and the capacity to transform organic functions and behavior into the patterned physiological activities and the symbolic behavior required for living in a symbolic cultural world and participating in a social order.

All of this means that we need more critical thinking that will recognize how many of our current assumptions are no longer valid or relevant,

[1] Included are the text of the Frank address, the texts of the contributions to the special symposium, "Child Development Research: The Next Twenty-Five Years," and summaries of the remaining symposia, of the paper sessions, and of the reports from the National Institutes of Health, as prepared by the respective chairmen. The support of the Field Foundation, which made both the meeting and the publication of the proceedings possible, is gratefully acknowledged.

and we also need more creative imagination to formulate the new problems which new concepts will generate. It may be appropriate to point out that we need more operational research in child development, that is, studies that are multidimensional and directed to the development of new methods and procedures for use by the various professions and agencies dealing with children and adolescents. As I pointed out in my Kurt Lewin lecture, "Research for What," frequently we accept grants for research from agencies seeking help in meeting concrete, operational problems and then use the funds to study theoretical problems of our discipline, the findings of which are rarely, if ever, genuinely useful to the agency financing the studies. I believe we should recognize that there are ethical considerations in accepting a grant for research.

For those who believe that the tried and true methods of research are the only dependable procedures, it may be useful to remember what Einstein and Infeld (2) said: "It needed great *scientific imagination* to realize that it is not the charges nor the particles, but the field in the space between charges and the particles which is essential for the description of physical events" (p. 259); also what Einstein (1) has said about the role of theory, namely: "There is no inductive method which could lead to the fundamental concepts of physics. Failure to understand this fact constitutes the basic philosophical error of so many investigators of the nineteenth century. . . . We now realize with special clarity how much in error are those theorists who believe that theory comes inductively from experience." The foregoing does not mean that students of child development should apply the methods and techniques of modern physics and chemistry, but rather should understand and apply the new concepts and assumptions, the new ways of thinking, especially about dynamic processes, and the new criteria of credibility so that their studies will reflect the emerging new climate of opinion.

As I see it, child development research has unlimited opportunities ahead to explore for new understanding of the organism-personality, and thereby to make basic contributions to all the human sciences and the various helping professions, especially medicine and psychiatry.

References

1. Einstein, A. Physics and reality. *J. Franklin Inst.*, 1936, 222, 349-389.
2. Einstein, A., & Infeld, L. *The evolution of physics.* Simon & Schuster, 1938.
3. Elsasser, W. *The physical foundations of biology.* Pergamon Press, 1958.
4. Rosenblueth, A., Wiener, N., & Bigelow, J. Behavior, purpose and teleology. *Phil. Sci.*, 1943, 10, 18-24.
5. Weaver, W. Organized complexities. *Amer. Scientist*, 1948, 36, 536-544.
6. Wiener, N. *Cybernetics.* Wiley, 1948.

SPECIAL SYMPOSIUM

CHILD DEVELOPMENT RESEARCH: THE NEXT TWENTY-FIVE YEARS

Chairman: LEONARD CARMICHAEL (Smithsonian Institution)

Participants:

JOHN E. ANDERSON (University of Minnesota)

ALFRED L. BALDWIN[2] (Cornell University)

DAVID M. LEVY (Private Practice and New York City Department of Health)

HAROLD C. STUART (Harvard University)

It is a pleasure to be invited to participate in this program which marks the twenty-fifth anniversary of the founding of the Society for Research in Child Development and to realize that the infant which was born with such high hopes 25 years ago is still very much alive and interested in its future, as suggested by the topic of the evening. Three years ago I attempted a brief history of Child Development, in which I indicated the main trends of the past 40 years as I saw them. I have always been impressed by the rapidity with which science moves forward as conceptions, methods, and results become outdated, and with the manner in which scientific organizations and the fields they represent constitute self-stabilizing systems with high input and outgo and much interchange and feedback among members. The body of information, principle, and theory which make up a science becomes an organic structure which grows in its own right. This growth is somewhat separate from the formal history of the organization with its succession of officers, the changes in its constitution and bylaws, the work of its committees, and its business transactions, which ideally facilitate the development and interchange of ideas, methods, and techniques. In a real sense our Society is more adequately represented by the publications of its members through its own and other sources.

Adventurous Thinking

Because of a recent experience, I hesitate to discuss future development in the field of child research. I have just finished reading Sir Frederick Bartlett's book on *Thinking*, in which some attention goes to the history of scientific activities. Bartlett distinguishes sharply between thinking in closed

[2] Dr. Baldwin's paper was not made available for inclusion in the Proceedings.

systems and thinking in open systems, or what he calls "adventurous thinking." By striking examples from the history of science, he points out that advances come not so much from theory as from a conjunction of what appear to be somewhat unrelated events which give scientists a "new look" at phenomena. It is this "new look" which sets off the process of theorizing and hypothesis formation which is essentially a routine or closed system examination of the implications of the insights attained. Examples of conjunction are: importing techniques from one scientific field into another, some experience which calls attention to the overlap between things and processes which unaided observation treats as different rather than as similar, or the application of a method developed in one area to problems in another within a science. Hence, the characteristic of adventurous thinking as contrasted with routine thinking, both of which are essential to science, is a kind of *opportunism* which looks for unusual relations in data or which turns to new methods to attack old problems. As a result, problems are pinpointed within a complex field and openings are created through which new knowledge is gained.

Such a point of view has two implications for our approach to children. We are now in a period in which almost everyone is concerned with a theory of child behavior and seeks to develop hypotheses which can be verified by specific experimentation. While Bartlett accepts this type of scientific work as necessary, he would call it routine rather than creative and would suggest more adventurous thinking. The second point which emerges is that, while prediction may be a pleasant activity, it really cannot be done because we do not know where the "new look" or the "new breakthrough" will occur. If we did, we would be engaging in the venturesome intellectual activity appropriate to the "new look" rather than talking about where it might come. In this sense life itself and scientific activity as a growing system as well are continually defeating history as they move off in new directions by virtue of unanticipated conjunctions which, when they appear, pinpoint problems and thus set off the complicated process of theory making and hypothesis checking with which most scientists are routinely engaged.

As I think back over our field, it seems to me one such conjunction which had tremendous consequence was Binet's discovery of the gadget which we now know as mental age, with its underlying technique of standardizing, which created a new approach to measurement. Another conjunction came from the application of sampling, which as a technique was developed for polling and from which there came the concept of cultural or socioeconomic status in measurable form. And who would have suspected that the Lewin experiments on atmospheres, created in the conflicting ideology that led to World War II, would have had such far-reaching consequences in our thinking? Now, the animal psychologists have taken over the problem of the effect of early training upon later behavior and are changing our conceptions of what an environment is in terms of stimulation.

May I, then, turn to various aspects of child development research, particularly within the psychological field, in which I think the next 25 years will add substantially to our knowledge.

Changes in Function with Age

Developmental psychology began with describing changes which take place with age or time in the growing organism. If one looks at the current literature, the study of changes with age or time seems to be of somewhat secondary importance because of the view that description or taxonomy does not deal with basic mechanisms. Recently I have been collecting material on changes with age in all types of psychological phenomena. This is what Shuttleworth attempted in his *Graphic Atlas* for the adolescent period, which was, however, restricted in the age span covered. When one faces a mass of data of this sort, particularly in graphic form, and views it as a whole, one is struck by its incompleteness horizontally in relation to function and process and vertically in relation to time. For some phenomena there are good pictures of age changes over a short span of years, but not for the whole span. For some we see the beginning of processes but not the terminal states. Some show terminal states, but not the beginnings of processes. Some of the recent work in perception shows changes that are difficult to explain in terms of our conventional systems of analyses. For instance, some illusions increase while others seem to decrease with age. While plotting age curves does not answer all our questions, nevertheless, it raises many problems of major psychological significance. One job for the future is to view systematically what we know about age changes and then fill the gaps, both by cross-section and by longitudinal techniques, in order to obtain a complete picture of what happens with time.

While we may say that what happens in time is affected or modified by external conditions, still a first step in determining the significance of the change is to find out whether or not change occurs. Some of our recent work has turned up phenomena which seem to be age-free, that is, invariant with age, and other phenomena which are age-specific, that is, change markedly with age. This is the major problem of the continuities and discontinuities within the developmental process and the modifications and transformations which occur within time. There has been a growing tendency in the recent literature to jump directly from infancy to adult life without emphasis on intermediate or intervening steps. We still have a strong tendency to regard whatever period of the life cycle we happen to study as characteristic of the whole, without making the effort to see whether or not the generalizations reached apply to other periods or not, or limiting or qualifying them in relation to the ongoing process.

This tendency to discount time or age is particularly surprising in view of the developments within modern physics in which time has come to be regarded as a fourth dimension and in which there has been a movement away from static models with invariant relations to models in which change

and dynamic relations are emphasized. If we view the human organism as an energy system with high input and high outgo, within a very complex environment, the problems of how stability or invariance is maintained within a framework of change emerge as significant.

In using "age" or "time," I am not implying that time or age are in themselves causative factors, but view them as the most convenient frame of reference about which to organize data. But there are two kinds of change, the progressive unfolding within the organism that transforms it and the induced change produced by stimulation which also transforms. But how do specific momentary experiences and/or transactional behavior get incorporated within the system of behavior and become effective; and how in turn do they affect subsequent development, both with respect to setting limits within which future development will take place and building the base upon which new forms of behavior can be built?

In the next 25 years, I suspect, we will move away from our concerns of the last 20 years toward a more classical approach to development with, however, better formulated problems and techniques. As a suggestion for facilitating the understanding of change, I suggest replicating investigations with similar techniques on children, adolescents, adults, and old people, that is, at well spaced intervals within the life cycle in order to bring into relief areas and problems on which more definitive studies of change could be undertaken.

Stimulation

A second area in which future developments are likely concerns the analysis of the types and amounts of stimulation needed by the growing child at various periods of his development in order to make the most effective use of his resources and to develop a good personality. Studies of the relation of early behavior to later outcomes have demonstrated relationship even though there is still controversy as to whether the effects found are the results of emotional stimulation, of sensory and intellectual stimulation, or of the individual attention given the child. It seems to be clear from the studies of Hebb and of Harlow that early perceptual experience and early learning facilitate later development and learning. From the Hebb studies has come the concept of a flow of stimulation necessary to maintain the effective functioning of the organism, known as arousal stimulation. Above this there is the specific cue stimulation which makes possible the identification of objects and the organization of the external world of space. In the literature there is some suggestion of a phenomenon like imprinting, to the effect that, unless stimulation comes early and intensely, anticipated levels of development cannot be reached. This places heavy emphasis upon what happens to the child in the very early years.

If we accept for the moment this view, we can then ask in detail questions about the nature of the environment in terms of stimulation content and pattern that facilitates development. This is one of the $64,000 practical

questions—since there are millions of persons setting such environments. I think that we now have much more insight into the problems involved, that animal psychologists and child psychologists have made substantial progress in formulating the significant problems, and that the next 25 years will enable us to write much more precise descriptions of facilitating environments.

Self-Repair

But suppose that we deal with children who have been exposed to very bad environments. What do we know about the types and amount of stimulation which, given later, will repair or compensate for deficiencies in early stimulation? Some data indicate more rapid rates of learning and more effective learning under comparable conditions at later ages. Studies of individual children who were exposed to incredible experiences during World War II, and of children with terrific experiences in ordinary living, sometimes show amazing recoveries with effective action at later age levels. What is the nature of the "self-repair mechanisms" inherent within living organisms if external stress is removed and the environment has an appropriate stimulating quality? We know very little about the mechanisms of recovery from psychological stress. For physical disease there is evidence of the existence of self-repair mechanisms and the concept that what medicine does is to make it possible for the person to cure himself. For both theoretical and practical purposes, we need knowledge of how stability is reestablished and how effectively function emerges. Obviously, we need more studies of the "end" or "long-time" effects of both negative and positive introduced conditions.

The Flow Concept and Learning

In the analysis of stimulation we are also concerned with the "flow concept" of human behavior, or the effect of iteration and continuity of stimulation upon the organism. The studies of Barker and Wright clearly reveal the complexity and the quantity of stimulation and of reaction which appear in children when observed for a complete day or for a succession of days and give quite a different picture of the child in the life situation than is obtained from the child in the more limited and controlled laboratory situation. Their generalizations are reinforced by other studies, particularly in the language and social area, which have recorded events over substantial periods of time. Here we are in the area of the phenomena which mold behavior. It becomes clear that what happens once or twice to a growing organism, unless it is a major catastrophe, is of little importance, but what happens a thousand times or ten thousand times over the years becomes of very great importance in the final structuring of behavior.

Organization, then, would seem to be not a matter of the moment, but of time. Here there are at least two distinct points of view, one of which is that single and particular experiences, either unfortunate or fortunate, had by the young child determine later outcomes. But another theory holds

that what happens to the young child in the home is symptomatic of what will happen to him at 7 years or 13 years or 16 years if he continues within the same home with the same parents. Thus, the determiners do not become single experiences so much as the iteration and reiteration of experiences. A flow theory is basically a probability or stochastic theory with emphasis on the fact that living is basically a process of decision making in an environment with high input and outgo. But the input is not 100 per cent of a single type or modality, as is so often the case in our experiments. It varies through a wide range of partial or incomplete reinforcement and slow rather than rapid or sudden emergence of permanent behavior. In this life situation there is likely to be both punishment and reward for the same responses from situation to situation. Moreover, there are special occasions and key decisions which channelize subsequent areas of behavior by modifying the stream of practice which should be studied in their own right as critical choice points. Nevertheless, the basic picture is one of interaction. From my point of view, at all ages from birth to maturity, we need extensive studies of the learning process in both laboratory and life situations. In particular, I think we need more studies of complex skills of all types. In recent years, as contrasted with the Twenties, very few studies have been done on the learning of complex skills by children; in fact, the total number of such studies ever made, despite our practical concern with problems of education and training, is rather limited. But very recently there has been a shift to studies of complex patterns and many interesting data have appeared that could well lead to corresponding experiments on children. I refer to three types of studies. There are, first, the studies by Welford and his associates at Cambridge, England, of the learning of complex patterns of varying levels of difficulty by older people. Next, there are the studies by the Air Force on the organization of complex skills involving serial action and decision making. Finally, there are the studies by Skinner and his associates on imposed patterns which are complex both spatially and temporally. Twenty-five years hence much more will be available from basic studies of stimulation and of learning upon which to base our practice.

The Organization of Energy within Time

Another area of importance involves moving from the specific patterns, skills, and activities, with which we have so far been concerned, to an examination of the way in which the different patterns, activities, and attitudes are fitted together into a total system of behavior or are integrated within the time schedule into a pattern of living. Here we know much less than we do about specific systems. The person has a certain amount of time at his disposal which he fills with certain activities. In the early period of life many activities are imposed; later on there is choice. We gain some impression of how time-filling is accomplished when we observe the spontaneous, evolved schedules of children under self-demand. There are clearly marked differences in the effectiveness with which individuals fill their

time with meaningful activities. Meaningful is used here in a very broad sense. If I were to expand it, I would go in two directions: in one direction toward later outcomes which enhance the personality; and in the other toward the more effective use of the resources available within and without the person. But here I am in some difficulty because of the value terms such as "enhancement" and "effective." While at the moment we cannot solve the semantic problem, we would, I think, admit to some consensus about what we mean by "good adjustment," "good uses of resources," "development of personality," etc. Nor do I think of these terms primarily in a moral or economic sense. We seek measures of what the person can do and does within his environment rather than what he says about his behavior. We are concerned with the area of the organization of energy within time. It is an area which is receiving attention in the studies of aging, since at retirement the person is suddenly thrown on his own resources and expected to work out a way of life in the absence of the controls that characterize our work-oriented and money-oriented society. From studies in this area, it is clear that the task of developing a meaningful pattern of activities that will fill time bears a relation to the person's emotional state and his level of adjustment. It is an area which will receive increasing attention in our thinking about the adult years as the work week is shortened and as more and more people are thrown on their own resources for larger periods of time. In the young child, with his great resources of energy, time is filled with play.

Problems which center in this area are concerned with the selection of one interest rather than another, the dropping of activities, the shift from incidental and occasional concern to deep and lasting concern, the substitution of one activity for another, and so on. There is also the emergence of a major vocational interest or activity, which becomes a core about which subsequent living is organized. The choice of a vocation is clearly not a matter of a particular moment of time, but is the outcome of an emerging pattern anchored in the development of the person. The developmental aspects of this problem are more and more clearly recognized by theorists and students of vocational psychology. While now we have little more to offer them than a general point of view, we may through our studies, especially longitudinal ones, be able to offer a substantial body of data and generalization 25 years hence.

Creativity

Finally, I come to an area of much current interest in which we have an opportunity to make a real contribution. Within education during the last 30 years there has emerged a concept of creativity, based on the fact that each person, given opportunities without prolonged exposure to imposed pattern, organizes his own particular experience and works out what to him is a unique pattern of response, even though it may resemble what others do. But we use the term creativity in quite a different sense as a

unique contribution to society which markedly affects other people and is recognized as such. The psychologists tend to interpret what the educator thinks of as creative experience for children in terms of the uniqueness of the product with regard to social standards, rather than in terms of the uniqueness of the product for the individual who organized it.

A major movement which came out of the emphasis upon the child's capacity to organize his own experience, given the opportunity, was that of progressive education with its hypothesis that education should center around the needs of the child as a person rather than around the needs of society as a society. Ever since Sputnik we have been in the midst of a reversal of this trend. There is emerging a strong emphasis upon imposed standards, periodic checks, utilizing the resources of the gifted child for society's benefit. Thus, we seem to oscillate in our society between emphasis upon rigid systems of control and lax systems of control in the rearing of children. Many popular writers trace the emphasis upon creative experience in education to research in Child Psychology and Child Development and thus place the responsibility upon our shoulders. In my own experience, Child Development research people seldom take an extreme view or divide themselves as sharply on this problem as do the practical people.

Nevertheless, it seems to me that this is a major area within which we have responsibilities. It is the area of control, of discipline, or motivation, of encouragement, of long-time goals versus short-term practices, of the relation of educational and training procedures to remote outcomes.

The child is a highly selective organism that moves through a wide range of stimulation and comes out with patterned behavior. Schedules appear even under self-demand, and some feel that the self-determined schedule is superior to the imposed one. But it is equally clear, if we look at the life histories of persons who develop complex activities at a high level, that there must be substantial concern with the activity over a long time. In other words, organization does not occur without much practice and repetition. We know more about the simple patterns than about the very complex patterns that involve creation over time. On the areas of artistic, literary, musical, and scientific creativity, we seem to know still less about the conditions within the environment of the child, using environment in its very broadest sense to include both home and school environment, which result in the most effective and lasting organizations of capacity.

These are practical problems now being put to us by society and which I think will come down upon us with increasing force within the next generation as our international and internal competition for a place in the sun is intensified. What are the answers which we can give to those who ask us about the development of gifted, normal, and handicapped children in terms of the appropriate time to locate stimulating material? What should its character be, and what should be included within the framework of atmosphere and control? In terms of long-time, not necessarily immediate results, what can we recommend that will produce the most significant

outcomes for the individual and for society? Are these two aims contradictory, or can they be reconciled within an educational or training program? These are puzzling questions of large scope about which we are being questioned and to which we can give only partial answers. While I recognize that there is no absolute answer, I have some confidence that we will contribute to their solution within the 25 years that lie ahead.

John E. Anderson

My purpose in this preview of future research in child development is not to supply a blueprint that covers the field or even a criticism of the kinds of investigations now in progress. That has been and will be amply afforded by the other speakers in this symposium.

My purpose is rather to direct your attention to what are called clinical observations and inquiry, at least to those which are clearly pertinent to your domain, to plead for a careful search into clinical manifestations of behavior, and to see if they can be rendered into data suitable for scientific study.

The method is a familiar one. I wish merely to give it more emphasis, more penetration and significance. The examples that follow are meant to illustrate the methods and the kinds of problems I have in mind.

Let us start with developmental studies of oppositional behavior. Observations of healthy infants at the breast even in the first neonatal week will dispel some naive notions you may have of their helpless passivity. When mothers try to wake up their drowsing infants and stimulate them in various ways to suck the breast, their resistance may take the form of clenching their jaws, pushing out the nipple, when forceably inserted into the mouth, even pushing away the breast with clenched fists. Such behavior is frequently seen as early as the second day postpartum. A mother after a difficult struggle with her baby may say, "He refuses to take my milk." She may become angry and scold vigorously.

A number of questions arise immediately to tempt the investigator. I will select three.

Consider the infant's resistant behavior. It can be well understood as a protection of a physiologic process, in this case of sleep. It can be seen also as a refractory phase in a feeding process, an attempt to quickly terminate one physiologic state and begin another before the first has been completed and before the second has been initiated by its own internal stimuli. A study of the feeding in the first neonatal week shows clearly that when babies, on scheduled breast feedings, are asleep when brought in to the mother, the vast majority of their feedings are classified as failures. A failure is defined as sucking continuity of four minutes or less during a period of approximately 30 minutes. On the other hand, babies who arrive crying, presumably hungry, are in the vast majority feeding successes, defined as sucking continuity of 20 minutes or more during the feeding

period. In their case there is no need to stimulate. On the contrary, the problem if any is to reduce their avidity.

Resistant behavior can be studied as a refractory phase in terms of physiology, as an essential protective mechanism to ensure the fulfillment of a function. That is a major investigation in itself.

It is seen later on in various forms of self-propelling behavior, as in the persistent repetitious performances regardless of obstacles in locomotor development, and in self-feeding. When a mother feeds the baby by means of a spoon, a change occurs after several months of its acceptance. Most frequently at 10 months the baby insistently takes the spoon and tries to feed himself. Then the battle of the spoon begins. Mothers come to terms with the baby by various forms of compromise. A few however remain adamant and deny the baby this growing bit of independence. We have examples in which babies then eject the food from their mouths when not allowed to spoonfeed themselves. (The mother's reaction to the baby's denial of her helping hand is an intimate part of this study.)

The first full flowering of resistant and independent behavior, the "no-no period" and the "I do it myself," is familiar to all of you. It reaches a high point most frequently at one and a half to two years of age. It has been the source of numerous investigations. Its particular chronology has been of interest also to comparative psychologists. The question is, why does the peak of resistance first occur at 18 to 24 months, rather than earlier or later?

Of the three questions selected from observations of mother and infant in the neonatal week, I have considered the infant's resistance to feeding. You will remember the remark made by a mother, "You won't take my milk." This remark like so many others under similar circumstances is a kind of projection. It carries an assumption that the newly born baby is motivated. The scoldings imply that the baby is fully aware of what he is doing. Though mothers can readily understand they are dealing with a physiological function, they seem bound to psychologize it. It is all too tempting. When the baby sucks well, he is good; when he sucks poorly, he is stubborn. The remark, "He doesn't like my milk," may be felt as a humiliation, an insult. Psychologists observing a feeding are apt to write down in their notes, "The baby refuses the breast." The temptation to the mother of implying a motive to her baby who represents an extension of herself is understandable. It is less so in the case of the psychologist observer. Nevertheless, it represents a typical human failing in all social relationships, namely, the tendency to see people in terms of projected feelings.

The second question I propose has to do with the developmental aspect of motivational and projective thinking in our culture. One of its origins is the animistic thinking of young children. Another is the training of children in motivation as a protection against possible disadvantage or harm.

Both questions appear to have an adaptive aspect: the first in the pursuit of one's own goal, the second in awareness of the goal of others. Though

bearing closely on mothers' reactions to the resistant feeder, the third question is in a different context. Now we would like to know how mothers differ among themselves in responding to the infant's resistance, and also the relation of the mothers' response to certain features of the patterns of resistance.

A day to day study indicates a difference in the mother's reactions in the first three days of the week. Then, she is unlikely to be impatient or annoyed with a resistant baby, or even to be persistent in stimulating the baby to suck.

After the first three days there is a marked difference. It would appear then as though the baby no longer appears to be so weak and helpless after the many hours of experience with his developing powerful sucking apparatus. The difference holds true for both primipara and multipara, though the latter have fewer feeding failures.

Further, a study of the resistant patterns reveals a difference in their capacity to arouse a strong reaction to frustration. A baby who persists in sleeping regardless of strong methods of arousal, like shaking the body or rolling the head, is least likely to get a full frustrating response, verbal and muscular. The fullest response is aroused by the infant who gives the mother all signs of awakening and gradual readiness to suck only to defeat her in the end. That infant is most likely to receive such epithets as, "My God! You bad baby," and even some retaliatory physical maneuvers.

Patterns of resistance can be tabulated and numbered. A full sequence that elicits a strong reaction may proceed as follows: opening of an eye, a movement of the head, parting of the lips, a few mouthing movements, accepting the nipple, a purchase upon it, retention of it without sucking, its release. It drops out of the infant's mouth. It is restored. It is not held. It is not sucked. The mother's efforts are all in vain. She is angry.

It appears as though every action of the baby in its entire sequence was encouraging. In every detail it lured her on to resume her efforts. The baby gave her every right to anticipate success. At the end she felt it was all a trap. Then, she is most likely to see her baby as highly motivated.

In reaction to frustration, which we may define here as a direct obstacle to a goal, mothers differ in their manner of response. Again we can tabulate their response in detail and in sequence. Besides differences in the strength and variety of their stimulating activities in attaining the goal and in retaliatory behavior, they differ in their verbalization. The verbalizations offer the simplest differentiation. One group of mothers express their feelings to the baby directly, in the second person, as in the expressions, "You bad baby," "You naughty thing," "I'm going to put you on a bottle as soon as I get you home." The other group express their feelings indirectly, or in the third person, for example, "It's making me nervous, he's getting me tired," omitting all incriminating epithets.

A standardized rating scale of these mothers according to their previous maternal interests shows that the former group contains mothers all above

the average, and the latter all below. Various situations in the mother and neonate studies are all consistent with these findings.

An interesting difference in maternal reactions is seen in painful feedings. When sucking is acutely painful as attested by muscular response and expletives of pain, none of the retaliatory expressions occurs. The same mother may be observed both in frustration and in painful feedings.

Such situations have all the advantages of controlled experiments. Such "experiments of nature" are often available to the clinical observer. It is this type of study to which I urge your attention.

The third question which has to do with differentiation of maternal response to patterns of infantile resistance leads us into the factor of maternal attitude. This factor can be isolated out of a variety of mother-neonate behaviors. We have indicated this factor in the reaction of frustration. All mothers suffer frustration at times in breast feeding their infants. The more maternal express it differently.

When a nurse brings the baby to a mother for a feeding, some mothers greet the baby, others do not. The greeting varies from a smile and a simple hello to a large variety of behavior, kissing sounds, excitement, patting, stroking, etc. Our question may then be put in this form. Is there proof of maternal attitude in the presence or absence of a greeting? Or, if you wish, is the presence of a greeting a differential for attitude? Analysis of our observations, using as a first criterion the behavior of the most and the least maternal mothers of our group, shows that it is not. The most and the least maternal may greet on one occasion and not on another. Further analysis shows that the condition of the baby when he arrives is the main determinant. If he comes asleep, he receives a greeting one time in six; if he comes crying, one time in three. Asleep apparently means to the mother the immediate and urgent job of waking him up. Crying means apparently that the baby is hungry and must be fed at once. When he arrives awake and quiet, he receives a greeting always. In all such cases, when there is a greeting, it is short, since presumably there is little time to waste in a rigid hospital schedule.

In those cases, however, when the baby is bottle fed by the nurse and is brought to the mother for a visit only, he always receives a greeting and a relatively long one, whether he comes awake and quiet, or crying or asleep. The problem of feeding by the mother does not exist. The pattern of greeting, however, when it occurs, does have a differential value for attitude, whether the baby is brought in for a visit or for feeding.

I am talking not of a chemical analysis but of a behavioral one. Is it not possible to isolate out of the compound of a classifiable bit of behavior its attitude and other components?

I believe it is an effort worth pursuing. We can find distinct marks of identification for maternal attitude in a large variety of situations. We can say that some situations bring it out more clearly than others. It can be found here in large amounts, and there in small amounts or hardly at all.

In some situations the job of feeding, as job, almost precludes the finding of attitude. Then, we study the job as job and try to see if there is a differential for attitude in the manner of performance. In that case excessive persistency, the zeal in getting the job thoroughly done, may run counter to maternal feeling and reveal a differential value.

As we sum up all the identifiable factors in each of a large variety of situations, we arrive at a functional analysis of the operation of attitude, or, put in another way, how feelings influence each pattern of behavior in a rather precise way, aiding or abetting the feeding. In the end we can define the components of maternal attitude, of devotion, interest, affection, and tenderness in their observable manifestations, and characterize each individual according to their characteristic and consistent behavior.

Each component, though part of a pattern, can be studied more or less in isolation. Each mother can be said to reveal this one component or the other in a larger or smaller degree. Thus, we find mothers who are affectionate, interested, and devoted but who lack tenderness; others whose devotion, as measured by persistency and other aspects of the task of feeding, is low but whose tenderness, as measured by the control of annoyance or impatience, and in the type of stimulations employed, is high.

In the examples I have utilized, the questions have been directed to data derived from observation. What do they tell us? We try to extract from them all they have to offer. But more and more questions arise. The experimentalist and the clinician then may differ in their viewpoint only in this way. The former asks what experiments can I set up? The clinician asks what observations do I need? Are they available? Their canons of scientific validity must be the same.

In closing, I do not wish to place the kind of clinical developmental studies portrayed in this paper in a competitive way. Many are already in progress. I wish merely to emphasize their value particularly in the study of human relationships and give some hints of a method of analyzing the behavior by which they are revealed.

David M. Levy

It is not my purpose to predict the course of child development research over the next 25 years; I can't imagine any aspect of life that far away and I don't expect to be around to check the accuracy of present predictions. My only certainty is that accelerating change will continue and that new interests, objectives, and methods will be operating in child development research as in all branches of science. Basic advances in all the fundamental sciences undoubtedly will provide new methodologies and other opportunities for broader understanding of children.

I would like to express at the start the hope that research workers in this field, as they delve more deeply into the minutiae of children's parts or processes, or as they manipulate the data obtained relating to them, do

not lose sight of the child himself as an individual totality. Unless progress is made toward the better understanding of what part each attribute plays in relation to total integration, opportunities will be lost to protect and promote his growth, development, and successful adaptations to the stresses and hazards of *his* environment.

It is in connection with this last thought that I propose to discuss two areas of research which I believe should receive more attention in the future than they have in the past. I will then discuss briefly a major opportunity which obviously is opening up and which should greatly facilitate these studies. The first area I refer to is that of "adaptations," or more accurately the development of mechanisms which make important adaptations possible. The second concerns the "environmental factors" which make these adaptive capacities necessary and which may stimulate their successful functioning. Further knowledge of the mechanisms involved in acquiring capacities to adapt should lead to a far better understanding of the reasons for some remarkable successes and many tragic failures in overcoming various stresses.

The major opportunity to which I referred has to do with the expanding range of studies of children with vastly different genetic backgrounds and living in extremely different environments. One can now look forward hopefully to integrated studies of the adaptations of different children to different environmental circumstances. These should provide important evidences as to why some children thrive under seemingly impossible circumstances while others fail under seemingly adequate ones.

I will now discuss briefly each of these closely related subjects which seem to me to call for concentrated efforts over the next 25 years, i.e., "adaptations," "environmental factors," and "opportunities for coordinated international studies of their interrelationships."

I believe it was Washburn who first used the phrase in my hearing "growth, development, and adaptation." I believe this was at the American Pediatric Society Annual Meeting in the year of his presidency. This phrase was in contrast to the then more conventional one of "growth and development." I had always thought of the development of adaptive mechanisms, or shall we say "capacities to adapt successfully to environmental or intrinsic stresses," as parts of total development. However, the use of the term "adaptation" focuses attention on the important aspects of development which are hidden and often overlooked. I am not thinking of "adaptation" in the biologic sense of change in the species, although recognized differences in racial and national groups may well reflect such background adaptations. Nor am I thinking chiefly of the learning processes within the conscious or volitional sphere. Of course, one can teach a child to swim, but I think it was Myrtle MacGraw who demonstrated that you can release an infant in a swimming pool and he will spontaneously and successfully swim, a rather startling example of exceedingly rapid adaptation to a new environment. (My memory of this experiment may have expanded with

time and I forget the age of the infant; however, there was a prompt and rather effective response to a new situation.)

My suggestion is that more research effort be expended over the coming years on trying to determine the mechanisms by which children acquire various adaptive capacities or how these adaptations take place. This has already been done to a significant extent in respect to immunological development but it needs to be done much more extensively in respect to physiologic, biochemical, endocrinological, and psychological aspects of maturation. To what extent are the steps in these changes age-linked or associated with given stages of development; to what extent are they dependent upon specific steps in the normal development of tissues, organs, or parts; and to what extent upon experiences and learning? Well-known adaptations which usually are made successfully without any notice but which sometimes fail are: (a) blocking ingress of whole proteins through an intestinal wall into the blood stream, failure of which may lead to allergic reactions; (b) immune responses to vaccines or after initial contacts with infecting organisms.

I should add that this field of adaptations to differing environments has been studied much more experimentally in regard to psychological adaptations than to physical or physiological ones, as some of the papers on the program of this meeting today have indicated. Incidentally, there is room for much study of the interrelationships between many different kinds of adaptive capacities. Is competence in one unrelated to that in another or is there such a thing as generally high adaptive capacities?

One of the adaptive capacities which I would like to speak about particularly is that of making the most effective use of available nutrients. I suppose this should be referred to as "biochemical adaptation" but it must involve many mechanisms, including adjustments in large motor activity, gastrointestinal processes, and the like. It appears that some children are able to maintain higher levels of biochemical concentrations or of cytological activities and of physiological functioning on lesser nutrient intakes than are others. It seems probable that children in some countries can do so more successfully than in others. What are the various mechanisms used and at what ages do they ordinarily become effective? Why is this so with some children and not with others?

Another type of adaptation which shows similar group and individual differences relates to survival despite chronic infestations. I will refer to this again in another connection .

To sum up, we need to know more about why some children grow and develop successfully under extremely bad environmental circumstances and often multiple chronic and debilitating illnesses while others are set back by every adverse wind that blows. The easy answer, of course, is that some chose their parents wisely, and this is surely part of the picture but probably not the whole. Comparative studies among different peoples and in widely different cultures and physical environments should gradually throw light on the principal mechanisms involved.

I will only make two points about the study of "environmental factors" which probably stimulate adaptive mechanisms and which at least determine the need for them. The study of these as they relate to individuals requires greatly improved methods of history taking. As they relate to communities and populations of children, it requires much more accurate information as to the nature, incidence, and severity of the hazards and stresses to which the population is constantly exposed. This raises important problems concerning the adequacy of the trained personnel available both for obtaining histories of individuals and general data respecting their environments. The longitudinal approach to the study of the interactions between the environmental factors and the child's development of effective adaptive mechanism will often be required before these interactions are fully understood.

I will turn now to the opportunities which are developing in many radically different parts of the world for various studies of child development. These open up bright prospects for effective international and coordinated studies of the development of adaptive mechanisms of many sorts and of responses to widely different environmental extremes. I have been impressed in recent years with the growing interest on the part of professional people in various countries who are trying to make progress in child development research. In my experience, of course, these have been for the most part physicians or public health personnel. These people clearly need assistance in the critical period of planning long-time studies.

In my Department at the Harvard School of Public Health mature and advanced students who hold key positions in their countries have been coming in increasing numbers over recent years with an interest in the study of child development. We have been providing a course in Growth and Development which has been elected by students representing various disciplines and who come from many parts of the world. Sometimes, they elect this course hoping to be told just how to study children in their countries and to learn precisely how to utilize our techniques, supposedly to study just what we have studied. In this course we try rather to have them leave with an enhanced understanding of basic principles and having developed some independent plans for a suitable method of operation under their known home conditions. We hope they will come to appreciate that it is not sufficient to assemble a lot of facts but that it is necessary to study their relevance to conditions in their specific situations.

The International Children's Center in Paris has made a most constructive start toward helping professional workers in various parts of the world to set up appropriate programs of research in child development to meet their specific ends. I had the pleasure of visiting this Center during its early days or at least in 1953 and my pediatric associate, Dr. Valadian, had a similar experience in 1957. We were happy to come to know Dr. Berthet, Director of this Center and Dr. Masse, Director of its medical activities.

Dr. Masse, who is an investigator at the Center now operating in Dakar, is now a student with us.

One of the first efforts of this Center was to provide a "Base Line of Investigations for Longitudinal Growth Studies of the Child" regardless of the part of the world in which they were to be carried out. This was edited by Dr. Frank Falkner, Coordination Officer of the International Children's Center Growth Studies, formerly of London and now in Louisville developing a longitudinal study of twins. The purpose of this "Base Line" is to provide certain common denominators of information to permit comparisons of groups of children in one place with those in another and to assure that comparable techniques are used in respect to them. It does not imply, as I understand it, any limitation in the exercise of ingenuity and the utilization of other procedures to meet special needs or serve particular purposes at any research center. Growth studies are now in operation in close association with the International Children's Center of Paris in London, Brussels, Stockholm, Zurich, Kampala, Dakar, Yugoslavia, and Louisville, Kentucky. I believe others are in the process of development.

This Society for Research in Child Development and its respective members will have increasing opportunity over the coming years for promoting research in child development in various parts of the world. One way of of doing this will be to help those who are struggling with the problems of setting up appropriate methodologies for the purposes which they have specifically in mind and for application under their given circumstances. Another and possibly more important way will be to help them coordinate and evaluate the findings at different centers. This Society should cooperate fully with the International Children's Center in Paris and try to supplement its work in any way possible. I suspect that team work or large scale cooperative efforts have not been as effective thus far in child development research as in other scientific efforts as, for example, in nuclear research. I hope the primary concentration on developing precision for testing and measuring which seems to have characterized the first 25 years of this Society will now give way to more concentrated efforts to understand the tested and the measured and the significance of the data derived from these procedures.

In conclusion, major objectives for this Society during the next 25 years might well be to promote comparable studies of different groups of children racially, nationally, and geographically with full consideration of the differences between them in environmental factors, including cultures and socioeconomic circumstances and in knowing the adaptations made by these children to these different circumstances.

I hope that further efforts will be made to expand the possible contributions of this Society toward these ends. Specifically this might take the direction of helping new centers, or people planning new studies such as the one I referred to in Papua and New Guinea, in getting over the painful

early stages of planning. We have all learned the hard way and they should be able to profit by our experiences. This would make possible short cuts to more useful studies.

I believe one goal should be to extend the sights of research workers from the establishment of new "norms," valuable as they would be to a more accurate appraisal of the features of child development in their areas. I hope they will be extended to include more precise knowledge of environmental circumstances which may be deterrents to development but subject to modification. Hopefully, there might grow out of such broader interests more difficult but important studies of an integrated nature which would provide knowledge of the adaptive mechanisms of children and their responses to various environmental stresses.

Harold C. Stuart

SPECIAL REPORT

CURRENT RESEARCH RELATING TO CHILDREN AT THE NATIONAL INSTITUTES OF HEALTH

Chairman: NANCY BAYLEY (National Institutes of Mental Health)

Summary

Part I

The occasion of the meeting of this multidisciplinary society seemed a most opportune one in which to give some idea of the nature and variety of research at the National Institutes of Health that is concerned in one way or another with children. This opening two-part session was thus scheduled for brief reports of a representative sample of these researches. We are sorry that there was not time to include all of the studies, or to give in complete detail reports of the studies outlined here.

In Part I, the reports were concerned primarily with the biological and physiochemical aspects of pathology, with their genetic and environmental etiology and with methods of correction and prevention of these pathologies.

We started with a series of studies from the National Institute of Arthritis and Metabolic Diseases. Henry N. Kirkman, of the Section of Metabolic Enzymes, reported his studies on galactosemia. Three enzymatic (chemical) steps are required within the body to alter galactose (a natural sugar found in the average diet) so that it can be utilized by the body. It was found in 1956 that the enzyme which makes possible the second step is greatly diminished or absent in the disease, galactosemia, a rare condition of children which results in cataracts and blindness, mental deficiency, and often death. On the basis of this enzymatic deficiency, a test was devised (by Kalckar and associates) which makes possible the prompt diagnosis of the disease from small samples of blood drawn from the infant at birth or subsequently. Early diagnosis and removal of galactose-containing foods from the diet of such affected infants had been previously known to enable many of the infants to develop normally. Although rare, the disease provides a model for the inheritance of disease in humans. A second blood test developed at this institution in 1957-1958 has shown that most of the apparently healthy parents of such children are also deficient in the affected enzyme, but only to the extent of 30 to 50 per cent. Thus, the healthy carriers of the disease can be traced through many generations, and the mode of inheritance of the disease can be studied. Affected infants are likely to appear only when two carriers of the disease marry and reproduce.

Joseph J. Bunim, Clinical Director, summarized four additional studies in the National Institute of Arthritis and Metabolic Diseases. In one of these,

for 20 cases of cretinism the degree of retardation was found to be related to age at diagnosis, age at beginning of treatment, and the intensiveness of treatment. With IQs varying from 10 to 100, the degree of retardation in a given individual was similar for all mental functions tested. The electroencephalographic changes were not related to the state of mental development, but rather to the immediate thyroid status. In another study N. R. Shulman is investigating the determinants of hemophilia, whether it is due to excess anticoagulent or some deficiency. This disease produces marked psychological problems, related to parental ambivalence, to the protracted periods of invalidism, and to the necessary protective restrictions against participation in normal activities. The third of these studies, by J. B. Field, is concerned with the chemical nature of insulin and its mechanisms of action in juvenile diabetes and the individual differences among patients in their daily requirements of insulin. These requirements range from moderate amounts up to 2,000 units. Bunim went on to report on studies of juvenile rheumatoid arthritis, of which there are from 50,000 to 100,000 cases in the U. S. Of these only 5 per cent die, and the majority recover with good functional status. He finds in such patients no significant mental features or serious psychological problems.

At the National Cancer Institute, acute leukemia is under intensive study, as reported by Emil Frei, Head, Chemotherapy Service, General Medicine Branch. The purposes of the study are improvement in chemotherapy with emphasis on trial of new and more active antileukemic agents, with a search for agents that will not lose their efficacy with use; improved methods in studying and managing infections, bleeding, and other complications; and basic studies of the nature of the leukemic process.

The Clinic of Surgery of the National Heart Institute, Robert D. Bloodwell reported, concerns itself with methods of diagnosis and management of surgical cardiac disease. Their work is with patients (mostly children) with congenital cardiac malformations and with rheumatic valvular diseases. In an effort to provide improved technics for the detection and localization of the defects causing intracardiac shunts, the efforts in the clinic have been extended in three principal directions: foreign gas technics, the use of indicator dye-dilution curves, and the application of contrast radiography (that is angiocardiography). The introduction at NIH of foreign gas technics, utilizing nitrous oxide and radioactive krypton^{85}, has led to a more precise detection and localization of left-to-right intracardiac shunts than has been possible by previous technics. The gathering of this precise diagnostic information is essential to intelligent surgical planning. The catheterization methods developed are also employed in accurate postoperative evaluation of the surgical results. The concern is with application of the latest surgical technics in the repair of various cardiac defects, as well as evaluation of these operations. Both closed cardiac surgery and open direct vision intracardiac surgery are performed. The method of induced general body hypothermia affords protection of vital organs while a short period of

interruption of circulation is carried out during the repair of less complex defects. More often they use temporary extracorporeal circulation for cardiopulmonary bypass utilizing a safe and efficient artificial heart-lung machine devised at the Institute, while the intracardiac repair is being accomplished. During the conduct of the operations constant recording of various physiological parameters is being carried out as an aid in evaluating the procedures. Physiological responses to extracorporeal circulation are being evaluated both clinically and experimentally.

William F. Windle, Chief, Laboratory of Neuroanatomical Sciences, National Institute of Neurological Diseases and Blindness, presented vividly, by means of a color motion picture, the effects of asphyxia neonatorum in monkeys, who were delivered by cesarian section near term and were asphyxiated by being kept inside intact amniotic sacs until severe respiratory distress was evident. The sacs were then opened and the infants resuscitated. One experiment was shown, in which the time between the separation of the fetus from the maternal circulation and the re-establishment of oxygenation was 12 minutes. The first spontaneous isolated gasps were seen 24 minutes following onset of asphyxiation. By 33 minutes there was almost continuous synchronous respiratory activity. The infant was in critical condition for the first four days and continued to require hand feeding for 67 days. Since the first week, this infant has clearly and increasingly shown many of the classical signs of cerebral palsy. It had marked asthenia from the beginning, and at 67 days it had ataxia and a steppage gait in the hind limbs, more marked in the right side. Choreiform movements of the head were observed from time to time. This infant has shown defects in learning ability: by day 67 it had not learned to feed itself, a feat the normal infant monkey can accomplish by 12 days.

Part II

In the second session of reports on NIH research, Richard L. Masland paved the way to the more behavioral studies by describing the collaborative project of the National Institute of Neurological Diseases and Blindness. To evaluate causes of neurological and sensory disorders arising during pregnancy and the early newborn period, 16 medical centers across the nation are collaborating in a project with NINDB as the coordinator and central laboratory. The nationwide study will follow some 40,000 mothers and their infants until they are 6 years of age. All unusual events during pregnancy are being carefully documented. Should a neurological disorder develop in the infant, an attempt will be made to correlate it with events and conditions of pregnancy, birth, or infancy which might possibly have caused brain damage. As causes are discovered, it is hoped that such disorders as cerebral palsy, mental retardation, blindness, and deafness may be prevented. The study is collaborative in nature, involving a close cooperation among the several institutions in following a relatively fixed basic procedure, and also interdisciplinary collaboration within the institutions. The personnel of the study include geneticists, epidemiologists, statisticians,

psychiatrists, psychologists, sociologists, obstetricians, physiologists, pediatricians, and neurologists. Another feature of importance is the fact that it is prospective rather than retrospective in character. The data are being processed according to protocols which include a detailed interview on socioeconomic and genetic data, repeated prenatal obstetrical examinations, observations throughout the labor and delivery, observations of the neonate in the delivery room and in the nursery, pediatric examination at 4 months, psychological examination at 8 months, neurological examination at 12 months, and a similar program of follow-up protocols for the children from 1 to 6 years of age. When abnormalities are detected, they will be compared with those occurring in a control sample drawn from the larger population studied.

The Child Research Branch of the National Institute of Mental Health under the direction of Fritz Redl[3] has been studying intensively over a period of six years, six aggressive, acting-out disturbed boys of normal intelligence. These boys were brought when about 9 years of age to a locked ward in the hospital where they lived in a closely supervised therapeutic milieu and attended a special in-hospital school. The staff worked to re-educate the boys to develop controls from within by such means as maintaining discipline while showing the boys they were loved, and by use of the life-space interview in giving relevant therapy at the time of an emotional outbreak. In addition, the boys were in intensive four-times-a-week psychotherapy. After three years, at which time the boys had markedly improved, they were moved to an open cottage which functioned as a halfway house, and at the same time, they were entered into community public schools. The new setting was designed to teach them to adjust to normal community life with greatly reduced external controls. In addition to this long term group, groups of younger aggressive children and of normal children have been observed more briefly for comparison. From the carefully documented records of this study much is being learned of a general nature about the diagnosis of such children, their personality patterns, the relationships between a child's environment and his mental health, as well as more specific methods for the care and treatment of hyperaggressive children.

In the NIMH Laboratory of Socio-Environmental Studies, Marion Radke-Yarrow and her staff in the Section of Social Development and Family Studies have conducted a series of studies on parent-child relations. They are concerned with developing a methodology that will reveal the important interactions in the setting the child experiences in his everyday living: naturalistic home studies and interactions in the context of immediate situational influences. They have found that many families will permit, and in time settle down to, stable and genuine behaviors under observation by scientists in the home situation. They select significant periods for obser-

[3] In September 1959, Dr. Redl left NIMH to become Distinguished Professor of Behavioral Sciences, Wayne State University.

vation rather than time-sampling and have successfully used as observers cultural-exchange college students, each living with a family for a summer. In an interview study by Melvin L. Kohn, it was found that there are considerable differences in perceptions of family relations among the members of the family. Answers given to the same questions by mother, father, and 10-year-old child showed variable agreement, from low to very high, depending on the area of intrafamily relationship. A comparison of class differences in values showed that working class parents are more concerned with the immediate consequences of a child's action, while middle class parents feel the child's intentions are more important. In another study they are comparing retrospective interview material with records that were made on the subjects as nursery school children one to 10 years earlier, in order to ascertain the accuracy of recall of interview material.

In the Section on Child Development of the Laboratory of Psychology, NIMH, the emphasis is in studying the relations between inherent and developmental characteristics in early infancy and conditioning or general environmental factors which affect them. Several studies are concerned with the interactions of young infants with significant stimuli (often their parents). Also there are continued explorations of developmental correlates of maternal and child behavior as recorded in one long-term growth study.

Richard Q. Bell reported the plan for a new program that is being developed by several psychologists and psychiatrists at NIMH, which will attempt to predict personality development in the first three years by studying interactions between certain kinds of parents and certain kinds of children. Young married couples will be seen in the preparental period so that they can be assessed for their characteristics prior to the impact of the particular child which will be born to them. Then, at a later point in time, their newborn infant will be studied. The idea is to obtain relatively independent observations of parent and infant before the process of child rearing has resulted in such a complex set of circular effects that make it impossible to disentangle the variables. A preliminary project on infants has been completed, and an analysis of 37 behavior characteristics and three physical characteristics of 32 male newborn infants yielded five factors. One factor appears to be sex-linked and thus genetically controlled, and is therefore an interesting one to study further. In the sample of 4-day-old male infants there was a negative correlation between skeletal muscle strength (measured by placing the infant on his stomach and noting, on a graded scale, ability to move body components) and nearly all the measures obtained reflecting skin sensitivity (usually measured in terms of magnitude of reaction to light skin contact on a given surface). Reports in the literature indicate both greater skin sensitivity and less muscular strength in females. But there is wide variation of these factors within each sex. It is planned to study this and other variables longitudinally.

Jacob L. Gewirtz outlined the theoretical basis for a planned series of experiments. He cited evidence that stimuli involving novelty, variety, and

complexity may function as reinforcing stimuli for instrumental learning independent of the traditional primary reinforcing stimuli provided typically by food, water, or the removal of noxious stimuli. He postulates further that conditioning is not necessarily social and he is carrying out a series of experiments in which the infants' own actions result in rewarding experiences that feed back to repetition of action. He plans to explore the earliest ages (possibly 1 to 6 months) in which this kind of operant conditioning can occur.

Harriet L. Rheingold is concerned with organizing theories of human behavior about observed data on infants (human and animal). From her observations she postulates that the human infant, certainly by 3 months of age, is not only aroused by his environment, but seeks to be aroused by it. She questions the Freudian doctrine that the oral need is all-consuming in the first six months, or that once fed, warm, and comfortable the baby withdraws interest from the outer world and falls asleep. She postulates, also, that in the process of being aroused by the environment the organism's behavior is shaped and maintained by the response he receives from the environment. For human infants as for mammals generally the objects which arouse them most are social ones. Social responsiveness is the first pattern of behavior, with the exception of such need-gratifying behavior as sucking, to develop in a form it will maintain throughout life. Reasons for the primacy of social objects are their high energy value (movement, sound, etc.), their source as satisfiers of biological needs, and the fact that people select the behaviors that will be reinforced, what the reinforcers will be, and their schedule of reinforcement. The responses are thus overdetermined. There is also evidence that in the human infant the characteristics of social responses (their conditions and their modes) are species-specific and biologically inherent.

Earl S. Schaefer and Nancy Bayley reported on the use of the records of the Berkeley Growth Study to study current theories of the effects of maternal behavior upon the personality development of the child. Reliable ratings of maternal behavior were obtained from unstructured written reports of observations of mother-child interaction during the first three years of life and from interview records at the child's age of 9 to 14 years. Both factor analysis and Guttman's circumplex method revealed an ordering of the variables within a two-dimensional space, with reference dimensions of Autonomy-Control and Love-Hostility. The latter of these was fairly consistent from observation to interview and from infancy to preadolescence. These maternal behaviors were found to be related to socioeconomic variables, with mothers of higher socioeconomic status tending to be more warm, understanding, and accepting, and mothers of lower status tending to be more controlling, irritable, and punitive. Analysis of the relationship of the maternal behavior ratings to the behavior of the child revealed patterns of interrelationship that show systematic changes through time.

ECOLOGICAL METHODS IN CHILD RESEARCH

Chairman: ROGER G. BARKER (University of Kansas)

Participants:

PAUL V. GUMP (Wayne University)
JOHN A. KING (Roscoe B. Jackson Memorial Laboratory)
JACOB S. KOUNIN (Wayne University)
PHIL H. SCHOGGEN (University of Oregon)
WILLIAM F. SOSKIN (Joint Commission on Mental Illness)
JOHN W. M. WHITING (Harvard University)

Discussants:

SIBYLLE K. ESCALONA (Albert Einstein College of Medicine)
DAVID SHAKOW (National Institute of Mental Health)

Summary

The chairman introduced the symposium by pointing to the unprecise meaning of the adjective *ecological* in the title. In an effort to focus the discussion, he pointed out that ecology is commonly defined as the study of organism-environment interrelationships under natural conditions. He suggested that the word *natural* has a special, limited meaning in an ecological context, namely, that it refers to phenomena which are not changed by the techniques used in observing and recording them. With this interpretation, the aim of the symposium was defined as contributing to the solution of a simple, but fundamental problem: How can one study a child's behavior and its circumstances without altering them? It was pointed out that this problem is not peculiar to the behavioral sciences, that the search for methods of observing and testing phenomena without distorting them is an old and continuing one in the physical and biological sciences, too. It was suggested that child psychologists can expect greatest help upon this problem from outside their restricted field, where experience has been greater.

King's paper pointed to dramatic parallels between ecological studies of mice and of humans. The first problem in both cases is to achieve contact with the organism being studied. This can be done in the case of Peromyscus by taking advantage of the readiness of this mouse to accept arti-

ficial housing. If a nest box is buried under the ground with an entrance on the surface, the mice will use it. Although the investigator thus distorts nature, the distortion is not extreme, because mice will enter any refuge and quite naturally exploit man's handiwork. When nest boxes (with removable tops) are distributed widely over fields inhabited by mice, and the mice have moved into them, the investigator is in a position to collect a wide variety of data upon behavior. By these methods there is an emerging picture of the psychological ecology of Peromyscus which suggests that the continuous interaction of this organism with the environment has created behavioral patterns characteristic of each species in a particular habitat. Examples of differing degrees of monogamy, maturation rate, and arborial habit were cited. It was pointed out, however, that the same environment may have a totally different, but predictable, effect on mice of different species with different phylectic histories, and it was emphasized that in ecological work methods and concepts for describing the environment are as crucial as those for describing behavior.

Soskin described a project aimed at developing the methodology and conceptual tools for studying the social behavior, particularly the verbal behavior, of a human subject in long sequences of spontaneously occurring natural situations. The technological approach was via a miniature radio transmitter small enough to be worn continuously by a subject as he went about his day, and a receiving station where all events could be monitored and tape recorded for later analysis. The subjects for the trial were two husband-wife teams and the setting a large summer resort of several hundred people of all ages. The transmitters worn by the couples could be easily disconnected by them in case something arose whose recording they could not tolerate.

This pilot project demonstrated that: (a) It is technically feasible to monitor continuously the verbal behavior of a subject moving freely through a community. One couple wore the transmitters for 12 consecutive days, the other for five. There are technical and regulatory limitations, however, that will dictate that future studies be carried on only in carefully selected communities, and it is unlikely that anyone will be able in the foreseeable future to make such studies in metropolitan centers. (b) Carefully chosen subjects can and will under proper circumstances open their personal lives to this kind of study. (c) The novelty of the experience extinguishes rapidly for the subjects. (d) There seems to be no area of their living and thinking into which subjects will not admit investigators, save one: at no time did either couple in this project discuss the research team itself.

It is difficult to convey the flavor of records obtained in this way. When attention is focused solely on the day-long copings of one individual and his drab-appearing microcosm, an exciting interplay of forces is revealed. One of the greatest obstacles to the study of naturally occurring behavior is the inability of the investigator to create an observation situation in which he can remain continuously detached and undistracted. His presence on

the scene usually influences events and requires some participation in them. By the method described, it is possible to maintain distance and perspective, and under these circumstances certain features begin to stand out in high relief.

Schoggen reported upon a study of the social-psychological environment of children under natural conditions. The basic procedure for gathering the raw data was the *specimen record,* a detailed, sequential narrative of a long segment of a child's behavior and situation as seen by skilled observers. Eighteen day-long specimen records at the Midwest Psychological Field Station provided the data for this study of the environment's behavior with respect to the subject of each record. The unit of analysis, a *social force unit,* is an action by the environmental agent which (a) occurs vis-a-vis the child, (b) is directed by the agent toward a recognizable end-state with respect to the child, and (c) is recognized as such by the child.

From this definition it is clear that only the observable and successful attempts made by the agents of the environment to penetrate the child's psychological world are included. Inactive parts of the environment and environmental action which is not directed to the child, as well as unsuccessful attempts to "contact" the child, are not considered. The total number of social force units in each record ranges from 130 to 336 with a median of 241. This means that a new unit began about every two and one-half minutes. There is a tendency toward a weak negative relation between number of units and age. Social force units can be described with respect to a very large number of characteristics.

Gump and Kounin discussed and illustrated from their own research a number of advantages and disadvantages of ecological research in comparison with experimental approaches. Advantages mentioned were:

1. *Ecological validity.* Only by observing the frequency of occurrence and impact upon behavior of milieu conditions (stimulating situations) under natural circumstances can the psychological significance of milieu variables be determined.

2. *Milieu integrity.* Experiment always involves a danger of wrenching the milieu phenomenon with which the experimenter is concerned from its context with the result that quite different consequences occur than in the natural, intact habitat.

3. *Behavior integrity.* Experiments which require a subject to behave in a certain way as part of the effort to control conditions cannot be easily interpreted when the required behavior is foreign to the normal stream of the subject's behavior.

Some limitations of the ecological approach were discussed: (a) Ecological approaches can be wasteful when the normal milieu and behavior streams present too few recurrent instances of the phenomenon of concern to the investigator. (b) Observational methods of collecting data necessarily omit all parts of the behavior stream that have no overt representation. Yet interviewing, which involves some interference with the naturally occurring

behavior stream, often reveals behavior changes, in attitude, for example. It is concluded that for completeness, ecological work will often require further clinical and experimental research.

Whiting reported an example of cross-cultural research upon personality development which makes use of ecological approaches of two sorts: (a) specimen records of the behavior and milieu stream under natural conditions in (b) equivalent circumstances (settings) within the different cultures. Much intercultural work on personality development and its cultural conditions has recognized the need for subjects of equivalent age, sex, health, etc., in the cultures studied. Whiting suggested that in addition there is need for studying the cultural forces and their consequences within equivalent settings. Only in this way can the personality factor in culture differences be isolated.

The discussion led by Shakow and Escalona emphasized both the necessity of recognizing ecological research as a fundamental, but neglected, area of behavior research and the necessity of improving the relevant techniques and concepts.

CURRENT RESEARCH AND THINKING ABOUT COGNITIVE PROCESSES IN CHILDREN

Chairman: Charles D. Smock (Purdue University)

Participants:

Alfred L. Baldwin (Cornell University)
Eugene S. Gollin (Queens College)
Jerome Kagan (Fels Institute)
Irving E. Sigel (Merrill-Palmer School)

Summary

The revival of interest in the study of cognitive processes is attributable to many factors within the current Zeitgeist in psychology. It is now clear to psychologists that complex cognitive and developmental phenomena *can* be investigated with operational clarity and without the restriction to trivialities inherent in the tenets of the early form of behaviorism. The systematic study of the developmental variables associated with perceptual organization, concept formation, decision processes, and problem solving are fundamental to an adequate understanding of personality and complex behavioral dynamics. It is probably fair to say, unfortunately, that neither Piaget nor Werner—both of whom have emphasized the significance of cognitive development—have been major influences in the recent interest in these processes. Psychologists and child developmentalists alike will profit from sharing their conceptualizations and empirical findings in these areas. The

purpose of this symposium was to stimulate and facilitate such communication. In addition, we hoped to arouse, and to focus, the achievement motivation and curiosities of researchers on the neglected problems associated with cognitive development.

The Developmental Study of Cognition (Gollin)

The advantages of a comparative-developmental approach are demonstrated in a number of experimental series. Functional disparities in performance associated with IQ, ontogenesis, and spatial and temporal manipulation of experimental conditions suggest that aspects of cognitive behavior are not readily accounted for in terms of association variables. Most modern learning theorists hold to some form of probabilism: that is, they assert that response is best understood as a direct or indirect function of environmental supplies. The present research, while recognizing the explanatory power of probabilistic formulations, revealed performance trends in the area of visual recognition, number manipulation, and the reproduction of abstract forms which indicated that factors in addition to the antecedent co-occurrence of environmental events and response events may contribute to complex activity. Dispositional differences associated with development, intellectual status, and so forth may reflect differences in biochemical functioning or they may be associated with environmentally instigated masteries such as language acquisition, or learning to cognize in relational rather than in absolute terms.

Development of Abstract Thinking in Children (Baldwin)

Differences in thinking between children and adults have been generally formulated in terms of the abstract-concrete dimension. Analysis of the behavior to which these terms refer indicates considerable divergence of meaning of the terms "concrete" and "abstract." An object may be conceived as a "bundle" of properties some of which are *necessary* (perceptual units) and some of which are *arbitrary* (functional units). Object character cannot be reduced either to perceptual field properties or to familiarity, but consists of *sets* of invariant properties. Thus, difficulty in problem-solving may arise from: (a) failure to divorce one property of an object from its other properties or (b) failure to divorce a situationally imposed property from object character per se. The "concreteness" of children's thinking may arise, therefore, from a lack of efficient discrimination due to a lack of training, or to individual characteristics that prevent the child from profiting from such training. Future research should concentrate on ecological studies of the actual "clusterings" in the child's natural environment and the relationship of these "clusterings" to problem-solving efficiency. The child's language and social environment provide analogous situations. Analysis of the probability structures of the "clusterings" inherent in these environments would advance our understanding of both cognitive and social development.

Conceptual Style and the Use of Affect Labels (Kagan)

Psychologists have only recently begun to investigate the significance of individual differences in mode of conceptualization and language usage for the understanding of complex personality and behavioral processes. This investigation was designed to explore individual differences in the use of labels describing affect states.

A system of categories of conceptualization were developed which took into account both formal and content variables. The formal conceptual categories included (a) concepts based on similarity among stimuli in objective, physical attributes, (b) concepts based on a categorical inference about a group of stimuli, and (c) concepts based on the functional relationship among stimuli.

Empirical data on 34 males and 24 females demonstrated that one type of conceptual response—the tendency to conceptualize human figures in terms of affect or feeling states—had a significant degree of intraindividual consistency across four different types of stimuli. In addition, this conceptual response showed stability over time and validity correlates with interview ratings of the individual's ability to discuss his motives, conflicts, and feelings during a five-hour interview.

It was suggested that this conceptual tendency was a measure of the degree to which an individual was aware of his affect and motive states. This variable is seen as orthogonal to motive strength and influences the content of all verbal protocols, whether they be conversation, questionnaire, or projective in nature.

Some Future Directions for Developmental Research on Problems of Cognition (Sigel)

There is need for more intensified research in dealing with the development of cognitive (intellective) functions. Theoretical and methodological problems abound here. Some theoretical issues elaborated upon were (a) integrating developmental theory: viewing cognitive functioning in the context of other developmental variables; and (b) identification of continuous and/or discontinuous patterns of growth.

Problem areas in need of further study were mentioned, e.g., (a) interaction between language and thought: how one influences the direction and efficiency of the other; (b) antecedents for particular types of developmental sequences: rate and direction of growth, parent-child relationships; and (c) correlates of particular aspects of cognitive activity with other personality and physical variables, and social and cultural conditions.

Methodological problems touched on included (a) detailed examination of influence of stimulus conditions, materials, and task requirements and (b) devising materials which are appropriate for wide age spans to enable comparative research.

Knowledge obtained from research of this kind was discussed in terms of its applicability to educational practice, especially curriculum building.

DEVELOPMENT AND FUNCTIONING OF MORAL STANDARDS

Chairman: MARTIN L. HOFFMAN (Merrill-Palmer School)

Participants:

JUSTIN M. ARONFREED (Eastern Pennsylvania Psychiatric Institute)
ARTHUR J. BRODBECK (Mount Sinai Hospital, Beverly Hills)
LAWRENCE KOHLBERG (Children's Hospital, Boston)
LEONARD M. LANSKY (Fels Research Institute)

Summary

Aronfreed reported a study which analyzed *moral consequences,* in terms of varieties of form and conditions of initiation and performance, in the responses shown by children to their own aggression. The relative extent to which internal vs. external cues and resources were used in children's moral reactions was assessed through a projective story-completion technique administered to 120 sixth-grade subjects divided equally by both sex and social class. "Guilt" responses, which relied on internal cognitive resources (e.g., self-blame, salf-evaluation, acceptance of responsibility), were frequent but could not be considered as primary or normative. Equally typical were responses of *external resolution,* such as perceiving others as punitive toward one's behavior, blaming others, or provoking external discovery and punishment. Since the two modes of moral consequence occurred with comparable frequency and more often in conjunction with than in exclusion of one another, they were viewed as functionally instrumental "affect-reducing" responses, rather than as "guilt" and "defenses against guilt." Some further distinctions of moral behaviors were also made in terms of the external cues initiating the behavior and the external resources used in its performance. These refinements revealed that even the most directly self-critical and corrective moral behaviors did not necessarily have *internal autonomy.*

Kohlberg reported a study of class differences in children's morality in which the view of internalization as a process of cognitive development was applied. This view questions the prevalent notion that moral standards are fixed cultural patterns internalized through some kind of motivational learning such as identification. It stresses instead the importance of experience in thinking about a standard before it can be internalized. Ninety boys representing three age levels, two socioeconomic levels, and two sociometric status levels made judgments about a number of conflict situations which present morally important and legitimate situational reasons for deviating from rules or authority. Class differences were found to operate in the same direction as age and sociometric status. The results were interpreted as de-

picting not class differences in value preferences, but differences in *form*, i.e., in ways of defining and resolving conflict situations which cut across content areas. Differences in the perspective taken on common existing institutions were postulated as resulting from differences in the level of participation with respect to the institutions, which in turn is a function of one's position within the social structure. Thus, for example, the person who participates actively at or near the top is better able to understand and reflect upon institutional requirements, and therefore to internalize them, than the person at the bottom who sees them as external and, to some degree, alien.

Lansky discussed the relationship between the concepts of "identification" and "moral standards" with particular reference to implications for research. Since the literature indicates that moral standards are multidimensional, measures of moral standards should also be multidimensional; what should be studied are *patterns* of standards. Further, patterns of standards for both parents and children should be investigated using identical or parallel sets of measures. In this way the degree of similarity between parent and child could be fully assessed, with the aid of available procedures for comparing profiles. Such an approach was viewed as necessary for the valid assessment of the degree to which children identify with their parents. Only with the complete picture thus provided would it be possible to make fruitful studies of the child-rearing antecedents of different aspects of the incorporation of parental standards, e.g., by comparing the parental practices of children who identify in varying degrees and in varying ways.

Brodbeck discussed some of the theoretical issues and methodological problems involved in doing research on the mass media as a socializing agency. He also reported some of the results of his own research. Most relevant to the topic of the symposium was the finding that adolescent boys showed an increase in aggressive feeling and aggressive drive after being subjected to a comic book story in which a child commits murder and gets away with it. Their conscious standards of right and wrong regarding aggression, however, were not affected by the story.

EARLY EXOGENOUS FACTORS IN INFANT DEVELOPMENT

Chairman: Benjamin Pasamanick (Ohio State University)

Participants:

Frances Graham (Madison, Wisconsin)
Hilda Knobloch (Children's Hospital, Columbus)
Seymour Levine (Ohio State University)

Summary

A Longitudinal Study of the Relationship between Perinatal Complications and Development at Three Years (Graham)

In this study approximately 350 children, first studied at birth, were re-examined at the age of three years to determine the relationship between perinatal complications and later development. Newborn measures included medical classification, ratings of factors in the medical history, oxygen saturation of the blood, and behavior tests. At three years of age, the children were given a neurological examination, the Stanford-Binet intelligence test, and a battery of special tests designed to measure aspects of perceptual-motor ability, conceptual ability, and personality characteristics. These tests are being standardized in a separate study of preschool normal and brain-injured children. Performance on the Stanford-Binet and on two of the special tests—a measure of vocabulary and a measure of conceptual ability—showed that perinatally complicated groups were significantly inferior to the uncomplicated group on all three tests. The effects of sex and of socioeconomic status differences were statistically controlled. It was also shown that impairment of conceptual ability was not accounted for by factors that the test has in common with vocabulary skill. The analysis of other measures, and of other relationships between newborn and three-year measures, had not been completed.

Exogenous Factors in Infant Development (Knobloch and Pasamanick)

The second paper described the relationship of socioeconomic factors to pregnancy experience and later neuropsychiatric functioning as investigated by a series of retrospective and anterospective epidemiologic studies. They demonstrated an increased amount of brain damage in the lower socioeconomic strata, where a higher incidence of pregnancy complications and a greater number of babies with low birth weights are found. In 992 infants examined at 40 weeks of age, pregnancy experience, birth weight, and later physical status were the only major factors which could explain group differences in developmental quotients. The studies further indicated that the relatively small amount of variability found in infancy could be explained largely by the presence of central nervous system damage and supported the view that at this period of life social factors affect the psychological level of integration primarily through the biological level. Later during the preschool period the direct influence of the socioculture on the psychological level becomes manifest.

Psychological and Physiological Aspects of Infantile Stimulation in the Rat (Levine)

The last paper discussed the interaction between infantile stimulation and physiological development in the rat. The data presented showed that infant animals stimulated during early infancy showed more rapid develop-

ment when compared with nonstimulated controls. Differences in maturation of the hypothalamo-hypophyseal system, differences in morphological development of the central nervous system, and difference in gross morphological growth, i.e., opening of eyes, appearance of hair, etc., were found between stimulated and nonstimulated infant rats. All of the developmental factors thus far investigated appeared earlier in stimulated infants.

Evidence for a critical period during which stimulation proved to be most effective was presented. This critical period appears to be during the first five days of life for the rat. In addition, no differences were found between various modes of stimulation, i.e., handling, shock, shaking, etc. The evidence seems to indicate that stimulation, even though noxious, alters the rate of development.

These data were interpreted as evidence for the importance of environmental effects upon development and maturation and that minimizing stimulation effectively retards development.

PARENTAL ATTITUDES AND CHILD-REARING PRACTICES

Chairman: WILLIAM E. BLATZ (University of Toronto)

ALBERT S. DREYER (Merrill-Palmer School). ***The Relation of Parent Behavior to Ego Functioning in Preschool Children.***

HELEN R. MARSHALL (University of Kentucky). ***Relations between Parent Attitudes and Children's Use of Language in Play with Peers.***

FORREST B. TYLER, JANET E. RAFFERTY, and BONNIE B. TYLER (Southern Illinois University). ***Sex Differences in Relationships between Parental Child-Rearing Motivations and Motivations of Children.***

MARVIN ZUCKERMAN (Indiana University Medical Center), BEATRICE BARRETT (Indiana University Medical Center), and RAYMOND M. BRAGIEL (Marion County Guild Guidance Clinic, Indianapolis). ***The Parental Attitudes of Parents of Child Guidance Cases: Comparisons with Normals; Investigations of Socioeconomic and Family Constellation Factors; and Relationships to Parents' Reactions to the Clinics.***

MARIE ORR SHERE (University of Illinois). ***Differential Behavior of Parents toward Their Cerebral Palsied and Non-Cerebral Palsied Twins.***

Summary

Five papers were presented at this meeting, and, although each one of them was of interest, and some significant results were available for interpretation, the whole of the time at the meeting was occupied with the giving of the papers. Although there was a common motif running through all five, each one was unique in its implications for the parent educator, clinician, or psychologist in the audience. They were presented in such a manner, however, that after the first two papers, it was difficult to concentrate on the remainder. The Chairman, who was more aware of this than the audience, suggested that when the last paper was finished and the time for adjournment approached, perhaps one, or at most two of the papers could be presented and stimulate a lively discussion from the floor. That this sug-

gestion was met with almost unanimous applause indicates that the listeners in conference would often enjoy an opportunity to be a participator. Most of the papers seemed to be preliminary reports, which might be considered an interesting trend in conference functioning. A brief summary of the papers follows.

Dreyer gave a preliminary report on a larger study of the relationship between parental attitudes and children's behavior. Using 14 preschool children and their parents, he found that, where children were overcontrolled by adult authority, they showed lower levels of aspiration. They were also less flexible in handling problems—gave up when faced with failure—and were more dependent. Opposite results were obtained for children not overcontrolled.

Marshall's study concerned the effect of parental attitudes on children's use of communication with their peers. One hundred children were used as subjects. Parents' attitudes were measured by Schaefer and Bell's PARI. An attempt was made to assess the strength of relationship by sex of parents and sex of children, and, although there seemed to be many trends, one could only conclude with the data presented that there did not seem to be any significant influence. There did appear to be some indication of a relationship in the data on frequency of the child's hostility acts and use of language: the frequency of children's hostility to peers correlated with three of the unhealthy PARI composite scores of their parents.

In the Tyler, Rafferty, and Tyler study, 34 preschool children, together with their parents, were subjects. Information was obtained from interviews with the parents and observation of the children in a preschool setting. The results indicated the significance of three motivations, recognition, love and affection, and dominance, of which the last seemed least important for the children. The conclusions can only be tentative because of their few numbers and their lack of agreement. The one point which the authors find heartening is that "the father must be considered at least equally as important as the mother in parent-child relationships."

A comparison of child guidance cases and so-called normals was undertaken by Zuckerman, Barrett, and Bragiel. Subjects were 162 mothers and 130 fathers from two child guidance clinics, and 181 mothers and 36 fathers from a normative sample. Parental attitude research instruments were used, as well as judgments by psychologists from case history reports. The results, on the whole, were ambiguous, with the exception of one factor, hostile rejection, which differentiated significantly between mothers of patients and normals. Interestingly enough, the direction of the differences was contrary to expectations, the clinical mothers scoring lower than the normals.

Shere reported a study-in-progress of 10 pairs of identical twins, one member of each pair having been diagnosed by a competent neurologist as being cerebral palsied and the other member being free from any diagnosed symptoms.

CROSS-CULTURAL STUDIES

Chairman: Lois Meek Stolz (Stanford University)

Josephine Arasteh (Princeton, New Jersey). *Child Rearing in Iran: Maternal Practices and Attitudes.*

Leigh Minturn Triandis and William Lambert (University of Illinois). *A Factor Analysis of Child Training Practices in Six Societies.*

Harold H. Anderson and Gladys L. Anderson (Michigan State University). *Cultural and Cross-National Factors in Personality Research with Children.*

Summary

The program on Cross-Cultural Studies was indicative of the changes which have occurred in child development research during the past 25 years, from two standpoints. In the 1930's our interest in research in other cultures was for the most part confined to a curiosity concerning research being conducted in ther countries. This was evidenced primarily in the *Child Development Abstracts* where one could find listed, and sometimes annotated, studies from England and Europe. However, there were few if any studies which attempted to investigate by similar methods identical problems in two or more cultures for comparative purposes. By contrast, the program for 1959 can boast two reports of studies which did do just that.

A change in the goal of research during the past quarter century is also evident. Formerly, anthropological and psychological studies were primarily concerned with description, endeavoring to answer such questions as "What are children like? How do they behave? How do they feel?" We still are engaged in such research, for there are many such questions yet to be answered, but much of the emphasis today is on a search for the *why* of children's behavior. This has brought about an avalanche of studies in the socialization process which seem at times almost to have wiped out other investigations.

The three studies reported on this program exemplify the trend both toward cross-sectional investigations and toward concern with the socialization process.

The study of practices and attitudes of 25 rural as contrasted with 25 urban mothers in Iran, which was reported by Arasteh, was a within-culture rather than a cross-cultural investigation. The data regarding child rearing were secured through interviews and covered such topics as weaning, swaddling, practices in relation to illness, methods of discipline, use of

relatives and servants for supplementary care. The findings were for the most part given in descriptive, nonstatistical terms with no evidence of the significance of the differences found between the rural and urban groups. The author believes that the changes in the urban group to later weaning, earlier removal of swaddling bands, greater reliance on the advice of physicians, less strict discipline and less physical punishment, and greater use of servants for child care are related to the social changes concomitant to rapid urbanization in Iran.

The report by Triandis and Lambert of child training practices in six societies is one part of the larger investigation made by Harvard, Yale, and Cornell of selected communities in the United States, Mexico, Okinawa, Philippines, India, and Africa. This investigation is a modern attempt by a research team to collect similar data by comparable techniques in six different cultures. The purpose is to relate patterns of child rearing to child behavior. However, Triandis limited her report to a factor analysis of child training practices. The data were collected by interviews with 24 mothers in each society except Africa which had data from 16 mothers. Twelve boys and 12 girls, ages 3 to 10 years, were the subjects of the interview. The areas covered included: disciplinary agents and techniques, time spent with child, warmth of mother and training in self-reliance, responsibility, obedience, sociability, aggression, and dependency. A comparison of the factor patterns revealed that the following factors were common to more than four societies, although not necessarily common to all six societies: warmth, variation in hostility, use of hostility in discipline, permissiveness, and responsibility training.

The final paper by Harold and Gladys Anderson dealt with the short written responses of some 9,000 10- and 13-year old children in seven countries (Germany, Mexico, Sweden, Norway, England, Finland, and the U.S.A.) to a series of unfinished stories dealing with teacher-pupil relations and mother-child relations. Findings were reported in terms of the percentages of children in each country who created story endings in which the child lies or tells the truth, the teacher trusts or mistrusts the children, is hostile, punishing, and so forth. In the discussion the authors related these findings to the general culture of the children although the study itself did not include investigation of cultural factors influencing the children's behavior at home or school.

In two of the reports given on this program data were presented concerning antecedent variables (child-rearing practices of mother) and in one concerning the consequent variables (imaginary behavior of children in reference to teacher and mother). In none of the studies reported do we have a picture of the antecedent–consequent continuum which is the focus of much of present day research endeavor. This we understand will come later from the Six Society study and will be a binding together of the *what* of 1934 with the *why* of 1959.

PROCEEDINGS

INFANCY AND GROWTH

Chairman: Herbert R. Stolz (Palo Alto, California)

Lewis Bernstein (Jewish Home for Asthmatic Children, Denver). *A Comparison of the Effects of Human and Machine Handling on Later Behavior in C57BL/6 Mice.*

Judy F. Rosenblith (Brown University). *Neonatal Assessment.*

Lewis P. Lipsitt and Nissim Levy (Brown University). *Pain Threshold in the Human Neonate.*

Benjamin Pasamanick (Columbus Psychiatric Institute and Hospital) and Hilda Knobloch (Children's Hospital, Columbus). *The Development of Adaptive Behavior in an Infant Gorilla.*

Dorothy Eichorn (University of California). *Two-Generation Similarities in Weight, Height and Weight/Height During the First Five Years.*

Charles Weer Goff (Yale University). *Human Epiphyseal Growth Control by Stapling. Histologic Evidence of Process.*

Summary

Under the general title, Infancy and Growth, the six papers presented a wide variety of subjects and approaches. The subject spread included 60 mice, an infant gorilla, a sample of human neonates, a group of children 3 to 30 months old, and a histological study of bone growth in children 8 to 16 years of age. In two of the studies reported, the emphasis was upon testing the feasibility and reliability of selected methods of research; in one the approach was controlled experimental to test a specific hypothesis; two emphasized comparisons in developmental phenomena; one sought to appraise the usefulness of a specific surgical technique. Obviously the frontiers of research in child development are being pushed out not only by new applications of old techniques, but also by the employment of novel devices for observing and measuring differences.

The following brief summaries of the several papers presented have been prepared from the abstracts supplied by the speakers.

In the Bernstein study, on the assumption that tactile stimulation of the animal is the important variable, it was predicted that human handling would be superior to machine handling in producing differences in later behavior and that machine handled animals would be superior to untreated animals. On the basis of tests of escape learning, activity in an open field, and timidity, these predictions were fulfilled.

Using the Maturation Scale, Vision Scale, Irritability Ratings, and Tension Ratings used by Graham *et al.* at St. Louis, Rosenblith determined the interscorer agreement and test-retest reliabilities of these measures and com-

pared the results with those reported by the St. Louis group. Adequate reliabilities were obtained for the two scales; the two ratings gave somewhat lower reliabilities. The findings did not confirm those of the St. Louis group of a steady increase in Maturation Scale scores with increasing age.

Lipsitt and Levy presented data from two studies of the threshold of withdrawal reaction to an aversive stimulus (mild shock) in the newborn within the first four days of life. Statistical analysis of these data corroborated the findings of Sherman and Graham *et al.*, showing significant increases in pain sensitivity with age, and also established that a reliable sex difference exists and that previous experience with mild shock has little or no influence on subsequent pain threshold determinations under a 24-hour retesting schedule.

As reported by Pasamanick and Knobloch, Gesell Developmental examinations and cinema recordings of behavior of a female gorilla were made every two weeks from birth to 40 weeks, every four weeks until 56 weeks, and again at 15, 18, 21, and 24 months. Among the conclusions from the data were: (a) qualitative difference from humans is present at birth and clearly defined at 10 weeks; (b) by 26 weeks behavior is crudely comparable to that of a 40-week-old human infant; (c) at 2 years development resembles that of a 9- to 11-month-old human infant; (d) adaptive behavior does not approach the level attained by the chimpanzee; (e) comparison of development of this gorilla with a male gorilla at 21 months indicates little difference due to 24-hour human care.

In the Eichorn study, measurements at corresponding ages of 20 parents (9 males, 11 females) were compared with those of 48 of their children (27 males, 21 females) under seven age categories. Measures were converted to standard scores and the correlations computed. It was concluded that (a) evidences of familial resemblances are found when a growth phase is established; (b) the consistently higher order of the body-build correlations indicates that the index carries more information than would be expected from a simple algebraic combination of the components.

Upon the basis of histological examination of 78 biopsy slices across the epiphyseal discs from children 8 to 16 years of age, Goff compared the effects upon growth of compression of the disc by stapling with those shown in animals. He concluded that (a) it is possible to take such biopsy specimens across a child's growing disc without altering its growth and (b) stapling is a useful surgical method of growth control.

PREDICTIONS AND COMPARISONS OVER TIME

Chairman: Rachel Stutsman Ball (Arizona State College)

John E. Anderson (University of Minnesota). ***The Prediction of Later Adjustment from Measures Obtained in Childhood.***

EMMY WERNER and BETTY GALLISTEL (University of Minnesota). *The Prediction of Later Outcomes, Such as Outstanding Performance, Delinquency, Dropping Out of School, Emotional Disturbance, from Childhood Evaluations.*

DALE B. HARRIS (University of Minnesota). *Psychological and Social Characteristics of a Group of School Drop-Outs.*

MARY COVER JONES (University of California). *A Comparison of the Attitudes and Interests of Ninth Graders Over Two Decades.*

MARGARET B. MCFARLAND, SARAH H. ARNAUD, and HOWARD A. MERMELSTEIN (University of Pittsburgh). *Etiology of Pseudo-Retardation in a Twelve-Year-Old Boy.*

Summary

What aspects of development are predictable? What inherent unfolding of the personality takes place without being affected by the vital influences of the home and the community? Such questions as these are posed and some answers are available from the five longitudinal studies presented at this session.

Anderson found that, even with a large group of children, adjustment outcomes can be evaluated and meaningfully compared with earlier personality and adjustment measures. Some of the aspects measured showed definite age-bound characteristics, while others were age-free. The change in the demands made upon the person as age and time pass brought about changes in the adjustment pattern. Such external forces of change cannot be predicted by any measuring instrument. While the prediction of the outcome was reasonably accurate for groups, the prediction was often inadequate for individuals. The long sequence of measures used in evaluating the children at the earlier age was more effective as a predictive device than any abbreviated form. However, it was felt that the combination of an intelligence measure with a carefully designed teacher's rating instrument seemed to operate better for long-time prediction than did the personality and adjustment inventories given to the children.

Further light upon this study of 4500 rural children was presented by Werner and Gallistel. Five to seven years after the original measures were taken, all children who had become delinquent, all who had received public recognition, special positions, or honors, and all in a representative grade who had dropped out of school were identified, and the significance of the differences between their mean scores on the earlier tests and the means of the corresponding sex and age groups for the total sample was determined. The measures showing greatest differentiation proved to be socio-economic status, IQ, a 10-item rating scale filled out by teachers, a responsibility measure, an adjustment inventory, and a follow-up interview assess-

ment of community reputation, and self-rating. The measures that were not effective were evaluations of play and recreational activities, work habits, a psychoneurotic inventory, and a sentence completion test.

This rural study also provided the basis for Harris' paper on school drop-outs in a group of 78 children, initially studied in the sixth grade. Of this group 31 boys and 17 girls (60 per cent) dropped school between the sixth and tenth grades. The drop-out boys tended to deviate more widely from the norms as they progressed through school. Cultural and achievement factors were more important than personality factors in contributing to early school drop-out. Boys were more likely to persist in school when they had more cultural advantages in the home, regardless of the father's job level. More personality differences existed for girls who drop out of school. They had less responsible attitudes and poorer personality characteristics as judged by teachers. None of the parents of drop-out girls and only three among the parents of the drop-out boys had completed high school. School leavers were not regarded as successful in the community as were their school-remaining classmates of comparable social status. The writer finds no evidence to warrant a major drive to curtail school leaving in the interest of salvaging wasted talent. It is not likely that specific counseling programs or curriculum modification will affect the problem except for a few youngsters who may be influenced by alert counselors.

These studies in rural Minnesota were made in the 1950's. Many changes in home life and in community influences upon child behavior have occurred in this decade. They contrast strikingly with the 1930's—the depression years. How predictable for the future are the measures gleaned from this period? This is a perennial problem in the longitudinal study of development. The changes taking place in our social environment produce far reaching effects upon the rate and direction of development. Earlier marriages, different sex standards, differing patterns of family life are part of this ever shifting factor of change that affects our patterns of development and our efforts at prediction.

Jones presented a challenging example of this process of change during two decades. Self-report inventories were given to a group of ninth graders in a stable community in the 1930's and 20 years later to another group of ninth graders in the same stable community, representing similar mental ability and socioeconomic status. The results showed that the children of today's sample are more similar to eleventh and twelfth grade children than to their own age group in the earlier sample. This is true in regard to vocational preferences, social-sex interests, attitudes toward school work, civil rights, women's roles, and world affairs. The comparison of responses suggests a greater maturity and perhaps more sense of responsibility among ninth graders in the present generation. In the fifties ninth grade girls profess significantly greater interest in sports. Boys indicate greater concern with grooming and dating activities.

The fifth paper presented by McFarland is an example of the effect of home influences, particularly of rejection by the mother upon a boy's mental functioning, showing that the measures taken of the boy gave a misleading impression that he was mentally retarded. Again the environmental effect was one which prevented accurate depiction of the child's ability.

PERSONALITY AND EMOTIONS

Chairman: Arthur T. Jersild (Columbia University)

Bruce D. Gardner, Damaris Pease, and Glenn R. Hawkes (Iowa State University). *Responses of Two-Year-Old Adopted Children to Controlled Stress Situations.*

Leland H. Stott (Merrill-Palmer School). *Social Behavior Traits in Relation to Certain Physical and Functional Characteristics in Young Children.*

Emanuel K. Beller, Ann W. Haeberle, and Peter B. Neubauer (Child Development Center, New York City). *Motivation and Conflict in Relation to Phantasy Responses of Young Children.*

Marjorie P. Honzik and John P. McKee (University of California). *Sex Differences in Thumbsucking.*

Niles Newton and Michael Newton (University of Mississippi). *The Relation of Certain Sociological, Medical and Psychological Factors to the Mother's Joy or Indifference the First Time She Sees Her Baby.*

Summary

The papers in this section of the program draw attention to some of the many variables that must be considered in accounting for even a small facet of the human personality. Some of the papers also suggest that to unravel the skein of human personality it is necessary to go beyond the null hypotheses, statistical correlations, and chi square formulas which play so large a role in current psychological research.

Responses of 2-year-old adopted and nonadopted children to stress situations were reported by Gardner, Pease, and Hawkes. In one stress situation, the children were presented with pegs too large to fit into the openings of a peg board (after having played with pegs that fitted nicely); in another the children were briefly left alone with a stranger. There were no significant group differences between the adopted and nonadopted children when their behavior was measured in terms of constructiveness and other qualities. However, children in both groups showed a great "richness" of individual response which eluded the *F* ratios or chi squares.

Stott found four factors interpreted as social behavior traits common to 4-year-old children: natural leadership, bossiness, individualistic tendency, and socially irresponsible impulsiveness. Physical size, skeletal maturity, and mental level were not significantly related to these traits. Natural leadership appeared to be linked to inner resourcefulness while bossiness correlated significantly with "external-functional" and physical factors such as high activity level, high *gross* and low *fine* muscular skill. There was a negative correlation between impulsiveness and fine muscular skill.

In the study by Beller, Haeberle, and Neubauer, projective play situations were used with children aged 4 to 6 who earlier, on the basis of direct observation, had been rated in terms of dependency and autonomous achievement drive strength and dependency conflict (defined in terms of the degree of similarity between the two first-named measures). In responding to projective materials, children who rated high in dependency (on the basis of their overt behavior) expressed more dependency, including needs for gratification, than did the children who had shown low dependency. They also more often introduced a mother if the projective materials contained no parent figure. "Dependency correlated negatively with dysphoria and aggressive fantasies." Dependency conflict correlated positively with the inclusion of threatening figures.

Honzik and McKee, drawing upon the data gathered in the well-known Guidance Study of the California Institute of Human Development, found that more girls than boys were thumbsuckers at all age levels from 21 months to 14 years; the difference was statistically significant at a number of ages during the preschool years. Biological as well as social factors apparently play a part in producing this difference. Thumbsucking by boys was not related to measures of masculinity-femininity, but the data suggest that the more feminine girls did more thumbsucking than the less feminine ones.

Findings in the study by Niles and Michael Newton suggest that the more a woman accepts her womanhood the more likely it is that she will enjoy the first sight of her offspring. The reactions of 492 mothers when first shown their newborn babies ranged from "greatly pleased" (157 women) through "smiled a little" (263 women) to "indifferent or disgusted" (72 women). The reactions did not seem to be related to physical variables such as health, use of forceps, pain deadening agents, or other obstetrical variables, even when these were "moderately traumatic." Instead, the reactions of the mothers appeared to be related to a number of sociological and personal variables, including race and education, a friendly attitude toward the medical personnel, and the mothers' attitudes toward distinctly feminine functions, such as breast-feeding and menstruation.

The two last-named studies suggest that the more self-accepting a girl is, the sweeter will be the taste of her thumb when she is a child and the sweeter will be the first sight of her baby when she is a woman.

SOCIAL ROLE PERCEPTIONS

Chairman: HELEN L. KOCH (University of Chicago)

WALTER EMMERICH (University of Colorado). *Young Children's Discriminations of Family Roles.*

HELEN I. SNYDER (University of Illinois). *Systematic Distortion in Perceiving Others' Behavior: A Thematic Rationale and Two Studies.*

EUGENE E. LEVITT (Indiana University Medical Center). *A Comparison of Parental and Self-Evaluations of Psychopathology in Children.*

STEVEN G. VANDENBERG (University of Michigan). *The Attitude of Twins Toward One Another.*

LUCY RAU (Stanford University). *Parental Antecedents of Identification.*

Summary

In spite of the title of the session, only a few of the papers dealt directly with the problems of role conception, development, or functioning. However, papers concerned with self-perception and identification at least overlap with, or survey from a different vantage point, many of the mechanisms of interest to the role theorist.

Emmerich's paper was one of those which dealt with role theory—with the development of family role concepts, such as those of adult and child, male and female. As always happens when one explores an area in detail, Emmerich discovered that the Parsonian formulations were oversimplifications deserving of some adjustment. While confirming Parsons' view that adults and children are differentiated chiefly in terms of power aspects of their roles, Emmerich reported that his boy subjects did not see boys as less nurturant than girls, even though mother and father roles were differentiated on the nurturance dimension in the way Parsons specified.

Perhaps suggesting some interpretation for the pattern of results Emmerich found puzzling is Snyder's paper which dealt with the question of mechanisms which lie back of lack of insight into another. Snyder holds the view that the beliefs an individual uses when interpreting the behavior of another are a function of his own need systems. Believing that adaptively and maladaptively withdrawn people have different need systems and developing an instrument in accordance with her theory, Snyder was able to differentiate between clinically diagnosed adaptively and maladaptively withdrawn persons. She is now busy checking her hypotheses with an instrument designed to reflect the eight personality patterns which her conception of the major parameters of need systems would dictate.

Also relating data bearing on the perception of the self and others to clinical concerns was the study of Levitt. He made it clear that mothers and their children do not necessarily assess the latter congruently on such items as are reported in the Manifest Anxiety Scale. Levitt's child subjects, who were the clients of a clinic, and their mothers both indicated in the way they checked the Scale that the children were anxious above average, though there was little congruence between parent and child in the details of the behavior and attitude reported. Whether this discordance reduces to the effects of standard differences, biases which blind, conscious or unconscious concealment of feeling, ignorance, or lack of insight, etc., is a question. At any rate, it seems apparent that mothers' reports to clinicians may give little insight as to how the child patient himself feels or interprets his status.

How that unique population of individuals, namely, twins, view their parents, others, and themselves was the territory which the Vandenberg study explored. Questions were raised as to the possibility of blurring of self-boundaries in twins and the effect upon the child's reaction to the parent and himself of having a strong alter ego in his twin from a very early age.

Rau's excellent paper dealt with one aspect of the identity problem, namely, identification. Although her hypotheses are being subjected to test, her paper presented no results but rather offered a conceptualization of identification, various classifications thereof, and probable mechanisms involved in the process or achievement of identification, defined as the tendency to find rewarding perceiving the self as like another. Rau's formulation is clarifying in that not only the putative learning basis of the achievement of identification is spelled out but the normal contingencies of the social and physical universe which tend to determine the probability of the occurrence of various relevant learnings are not overlooked. Parents, for instance, who tend readily to become identification figures, have a different effect on the identification achievement of their children in their roles as model, gratifier, instructor, and reinforcer. Though many have pointed to identification as a learned attitude, a cogent description such as Rau's of the field character of the forces through which learning operates represents a substantial contribution. Particularly challenging were Rau's theories as to how parental control and permissiveness facilitate or retard identification.

LEARNING AND COGNITION AND INTELLIGENCE

Chairman: Bess Goodykoontz (U. S. Office of Education)

Glenn Terrell (University of Colorado). ***Manipulation Motivation in Children.***

WILLIAM J. MEYER and STANLEY B. SEIDMAN (University of Pittsburgh). *Age Difference in the Effectiveness of Different Verbal Reinforcement Combinations on the Acquisition of a Simple Concept.*

J. RICHARD SUCHMAN (University of Illinois). *Training Children in Scientific Inquiry.*

FRED T. TYLER and HAROLD E. JONES (University of California). *Intra-Individual Differences Among Some Measures of Cognitive Functions.*

CARSON MCGUIRE, F. J. KING, and EARL JENNINGS (University of Texas). *Preliminary Factor Studies from the Human Talent Project.*

THERON ALEXANDER and JERRY ALPERN (State University of Iowa). *Psychological and Physiological Pathology of Intellection.*

Summary

The papers in this session indicated a healthy trend toward applying current theories of learning and cognition in carrying out experiments with children and in exploring age and ability differences in learning and mental organization.

Terrell found that children learned better to generalize the concept of large when they played a game of pretending to put promised candy in a bag, as compared with a mere promise of candy or with only a flashing light to signal the correct response. He hypothesized the potency of the manipulative process as an aid in learning.

In the Meyer and Seidman study older children (4- and 5-year-olds vs. 8- and 9-year-olds) learned more readily to select according to the concept of larger. They also found that the younger children needed more information in order to respond appropriately. The relevance to teaching practices was pointed out.

Suchman reported an investigation in which fourth grade children were shown motion pictures of science demonstrations. Those who were required to work out explanations by formulating and asking questions that could be answered by only a "yes" or a "no," whether in individual or group sessions, did better than children who were given explanatory lectures.

Tyler and Jones administered the subtests of two forms of the Terman Group test twice in grade 6 and twice in grade 8 to 90 boys and analyzed the data for similarities and differences of patterns in scores. Instability of profiles, both in individual boys and between tests, shows the need for caution in their use for guidance and prediction of individual growth.

A large battery of tests (measuring intelligence, attitudes, and other personality variables) administered to 710 seventh grade students were factor analyzed by McGuire and his associates. Seven factors were identified. Although there was a core of stably identified factors, there were also sex differences both in loadings and in some factors and even more marked differences between groups divided according to general level of ability.

Alexander and Alpern reported scores on perception and problem solving based on answers given in the projective Adult-Child Interaction test by three groups of children, 6 to 12 years of age. Normal children were significantly superior. Nonorganic subnormal children did significantly better than children with abnormal brain physiology even though the two latter groups had similar IQs.

THINKING

Chairman: WILLARD C. OLSON (University of Michigan)

BETSY WORTH ESTES (University of Kentucky). *Judgment of Size.*

DELORES DURKIN (University of California). *The Specificity of Children's Moral Judgments.*

ELEANOR L. ROBINSON (University of Minnesota). *The Form and the Imaginative Content of Children's Block Buildings.*

JOACHIM F. WOHLWILL (Clark University). *A Study of the Development of the Number Concept by Scalogram Analysis.*

ROLF E. MUUSS (State University of Iowa). *A Comparison of "High Causally" and "Low Causally" Oriented Sixth Grade Children in Respect to a Perceptual "Intolerance of Ambiguity" Test.*

MIRIAM F. FIEDLER (National Institute of Neurological Diseases and Blindness). *Integrative Ability of Young Deaf Children.*

Summary

The research reported in the six papers in this session dealt with some of the classical problems of child psychology, such as the development of concepts of form, thinking and reasoning, moral judgments, and effects of deprivation. Taken as a group, the papers tended to test hypotheses that confirm existing theory and findings. They extended and made more precise the knowledge of change with age and brought out the nature of the cautions to be observed in the generalization of findings.

Thus, Estes reported the absence of age change in correctness of judgment of size for similar and dissimilar shapes from kindergarten through engineering students in college. Some decrease in variability of judgments occurred with increase in age. This suggests the need for study in the period zero to 6 years of age if developmental trends in perception of form and concept of size are to be uncovered.

Piaget, working with young children, has theorized that the acceptance of reciprocity as a principle of justice is positively related to age. His find-

ings were based on stories depicting acts of physical aggression. The Durkin findings suggest that reciprocity and nonreciprocity responses are dependent on the situation, i.e., whether physical aggression, sharing, taking of property, and defamation of character. The tendency for reciprocity responses in physical aggression did indeed increase from grades 2 to 5 but reversed and almost disappeared by grade 8.

The study by Robinson demonstrated clearly that children use blocks to represent an ever widening range of ideas since with age they use more time, more blocks, and increase the size and symmetry of the block building. Her account of the imaginery activity accompanying building with blocks indicates again the projective significance of such material for personality study.

Qualitative and quantitative aspects of concept formation were demonstrated in the reports by Wohlwill and Muuss. In the period age 4 to 7 Wohlwill discerned three stages in the conceptualization of number: perceptual, symbolic, and superordinate comprehension of relationship. These were seen as a continuum along a cumulative scale.

Muuss presented some implications for individual differences. He identified "high causally" and "low causally" oriented children in the sixth grade and then contrasted their performances involving guessing and feelings of certainty. Various hypotheses were confirmed such as the unwillingness of the "highs" to guess and their willingness to wait for more complete presentation of data.

Fiedler compared deaf and hearing children ages 7 and 8 in performance on the World Test. She confirmed hypotheses of deaf children showing less integrative ability, more evidence of deviant thinking, more signs of emotional disturbance, and less interest in interpersonal relations. However, there were a substantial number of exceptions and she noted that no evidence was advanced that the trends are inevitable concomitants of deafness.

Arnold Gesell
1948

ARNOLD GESELL

On His Eightieth Birthday

It is with profound pleasure that *Child Development* dedicates this issue to one of the great pioneers of child development, Arnold Gesell, on the occasion of his eightieth birthday, June 21, 1960. His life has been one incredibly concentrated and remarkably single-minded effort directed towards the scientific investigation and guidance of child behavior. From the time of his graduation from normal school before the age of 20, and in his various capacities (as school teacher and principal and, in turn, graduate student in psychology, professor of psychology, medical student, clinical psychologist, physician, investigator, author, and teacher) until this very day, Dr. Gesell has bent all his efforts to activities in behalf of children. His name throughout the world both to lay and professional minds is associated with the furtherance of child development.

The first generation of child psychologists included such great figures as Stanley Hall, Lightner Witmer, and John Dewey; the second, Terman, Goddard, Watson, and others. Arnold Gesell stems from this second generation.

After an extended period of preparation and training at Wisconsin in education, with G. Stanley Hall at Clark in psychology, and finally in medicine at Yale, interspersed with practical experience in these fields, Dr. Gesell adopted the infant and preschool periods as his specific area of concentration. He then began the long and tedious task of categorization and quantification of behavior patterns, establishing the norms and the methods upon which countless investigators and clinicians have based their work in the last three or four decades. Over the years he gradually developed a very broad conceptual model of development, embracing and integrating levels from the anatomical through the physiological and psychological to the social and cultural. He made development the core of an outlook upon medicine and all the life sciences pertaining to man. Periodically, Arnold Gesell, in paper after paper, magically lit up enormous vistas for his stu-

Child Develpm., 1960, 31, 241-242.

dents. At the same time, he and his staff of devoted investigators filled the interstices of hypothesis and theory with volumes of quantitative normative and naturalistic data. Pattern after pattern at one key age after another was defined, described, and related to preceding and succeeding patterns to construct a corpus of knowledge which has been incorporated into the daily activities of the pediatrician, child neurologist, and psychologist.

As Professor of Child Hygiene at Yale and Director of the Clinic of Child Development until his retirement in 1948, Arnold Gesell concurrently continued his longitudinal normative studies, applied the derived methods and schedules to various problems, clinical and nonclinical, established a large community clinical service, and trained undergraduates and graduates in medicine. Since his retirement, he has continued his interest and activities in the same areas with additional concentration in the patterning of visual behavior.

In Dr. Gesell's view a scientific clinical psychology and psychiatry should be based primarily on a science of normal human growth and only secondarily on psychopathology, particularly a psychopathology conceptually derived from a study in theory of adult symptoms. He contributed enormously, however, to the psychopathology of childhood, particularly in the area of brain injury. There are, in fact, few areas Arnold Gesell did not help to enlighten—mental deficiency, handicapping conditions of all types in children, infant feeding, preventive medicine, and many others. No one has been more influential in shaping the modern practice of pediatrics.

Arnold Gesell has always insisted that in America heredity and constitutional factors have been neglected in research and theory building, with consequent undue emphasis on learning and conditioning. His own activities were therefore largely in the former biological areas, but in actuality he and his co-workers contributed considerably to the latter, particularly methodological approaches. Amongst a number of methodological advances in child development, Dr. Gesell contributed cinemanalysis as a means of systematic time-space study of frozen sections of behavioral morphology. Another was the co-twin control method of investigation.

Arnold Gesell's contributions to science are as many and as long as his bibliography which consists of hundreds of monographs, papers, and books. They have been incorporated into the living body of the life sciences, never to be lost. On this occasion of his eightieth birthday we should like to extend to him our deepfelt wishes for many more happy and productive years.

BENJAMIN PASAMANICK

Columbus Psychiatric Institute and Hospital, State of Ohio

MATERNAL REACTIONS AND THE DEVELOPMENT OF INDEPENDENCE AND ACHIEVEMENT BEHAVIOR IN YOUNG CHILDREN[1]

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The achievement motive has been the subject of much psychological research in recent years. The concerted efforts of McClelland and his colleagues, for example, have produced a number of investigations of achievement motivation and its behavioral correlates (2, 5). Almost all these and other studies of achievement, however, have been limited to subjects of high school age or older. With the exception of a very few studies, such as those of Winterbottom (8), Rosen (6), and Kagan *et al.* (4), little research has been conducted with children; almost none has been directly concerned with the origins and early development of achievement behaviors. In child development research, on the other hand, an extensive body of knowledge has been obtained in respect to the development of children's mental and physical abilities—the tools for achievement behavior—while research on the development of achievement behavior *per se* has not been undertaken.

Individual differences in achievement motivation are discernible in young children as they emerge from infancy. During the early development of prehension and locomotion, for example, many children are observed constantly to strive and persist in their attempts to develop these skills while the efforts of other children are sporadic and desultory. By nursery school age, differences in children's achievement motivation and behaviors are evident in a variety of areas. How do these differences develop? Presumably, the achievement need, like other need systems, is a product of social learning situations and reinforcements which children experience in their daily lives. Achievement behavior of children, like other social behaviors, should increase as children experience satisfactions and rewards for their efforts and decrease when such reinforcements are not forthcoming.

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[1] This study was one of several preliminary studies of a larger research project, "Parents as identification models and reinforcers of children's achievement development," supported in part by a special grant from the National Institute of Mental Health, United States Public Health Service.

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It might be expected, then, that children who display strong achievement propensities by nursery school age or grade school age are those who, in earlier learning situations, have frequently received approval from others for their accomplishments. Children who are rewarded for achievement striving and for proficient performance should, in time, come to value achievement activities as potential sources of satisfaction and security. In addition, these children should develop expectations that their achievement efforts will be successful. Thus, because they have come to value achievement as a potential source of satisfaction and have expectations that their efforts will lead to successful attainments and approval, these children should develop strong achievement motivation and should seek out and participate in achievement activities when these activities are available.

Other factors may influence the achievement development of young children. For example, the resolution of dependence and the growth of independence and self-reliance may play an additional role in this development. Dependent children are more apt to rely on other persons and less on their own resources and efforts and are therefore less likely to find occasions to develop achievement skills or to experience satisfactions for independent accomplishments. Independence training, as well as direct parental reinforcements of children's achievement efforts, then, might be expected to foster children's achievement development.

The present study attempts to assess relationships between young children's independence and achievement development and to evaluate antecedents of achievement behaviors. More specifically the study investigated: (a) the relationships between children's independence and achievement behaviors, (b) the generality of these behaviors from home to nursery school settings, and (c) the observed maternal reactions to these behaviors as potential determinants of children's achievement development.

Method

The sample of the study was composed of 30 three-, four- and five-year-old children, 19 boys and 11 girls, and their mothers. The children and their families were members of the Fels Research Institute's Longitudinal Study. Almost all of the families were middle-class, and the parents were better educated and tested higher on intelligence tests than national averages. The mean Stanford-Binet IQ of the children was 118, with a SD of 18. All of the children attended the Fels Institute's Experimental Nursery School.

During the three weeks the children participated in the nursery school program, their free-play behaviors were independently rated by two trained observers.[2] Daily time-sample observations of each child were made, and

[2] The authors would like to express their appreciation to Mrs. Phyllis Cannon who, along with one of the junior authors (AR), acted as a nursery school observer and rater, and to Dr. Virginia Nelson who administered intelligence tests to the children.

a number of dimensions of social behavior were subsequently rated. A more detailed description of the rating variables, the rating scales, and the rating procedures has been published elsewhere (2). For the present study, four social behavior variables were selected for special analysis. These variables were: (a) amount of achievement efforts exhibited during free-play, (b) amount of help-seeking from adults, (c) amount of emotional support-seeking from adults, and (d) amount of approval-seeking from adults. General instructions to the raters for the variables under consideration were as follows. *Amount of achievement efforts:* "How often and persistently does the child attempt to accomplish tasks requiring skill and effort? Ratings should be based on behaviors indicative of the child's desire: (a) to develop and improve skills required by various activities and tasks, (b) to successfully complete what he attempts to do, and (c) to perform these activities competently. Disregard the success of the child's efforts." *Approval seeking:* "How often does the child overtly seek approval and praise for his accomplishments?" *Help seeking:* "How often does the child turn to an adult for help with a problem? Ratings should be restricted to information-seeking, guidance-seeking, and instrumental help-seeking and should not include behaviors aimed at obtaining emotional support, sympathy, or reassurance." *Emotional support seeking:* "How often does the child turn to an adult for emotional support when he is hurt, afraid, or insecure? Restrict your ratings to behaviors aimed at obtaining support, sympathy, or reassurance. Do not include help-seeking overtures."

Prior to the children's attendance in the Fels Nursery School, they were also observed as they interacted with their mothers in their homes. A Fels Home Visitor made these observations and rated the children's behavior in respect to the same four variables rated by the two nursery school observers.[3] The Home Visitor also rated the mothers' reactions to their children's behaviors. The mothers were rated for the degree to which they rewarded each of the four systems of child behavior under investigation. The mothers were also rated for the amount of general affection they expressed toward their children. In summary, then, the data of the study consisted of: (a) ratings of the children's nursery school behaviors, (b) ratings of the children's behaviors with their mothers in their homes, and (c) ratings of the mothers' reactions to the children's behaviors.

Results

Relationships among the children's free-play behaviors. The children's four free-play behavior variables were analyzed for possible sex differences. The Mann-Whitney U-Test was employed for this purpose, and no statistically significant differences were obtained. Thus, at this age, no marked sex differentiation in free-play achivement behavior or in the dependent behav-

[3] One of the junior authors (AP) was the Home Visitor for this study.

iors of help-seeking, support-seeking, or approval-seeking were evident. Sex differentiation in these behaviors apparently does not transpire in middle-class children until early grade school age. In another study employing the same methods and variables as the present investigation, the writers found sex differentiation in the free-play behaviors of six-, seven- and eight-year-old children (3). By early grade school age, while there was no difference in the amount of achievement efforts of these older boys and girls, the girls more often sought help, emotional support, and approval from adults than the boys. In the present study, however, at nursery school age these differences were not yet apparent.

TABLE 1

RELATIONSHIPS AMONG THE CHILDREN'S FREE-PLAY BEHAVIORS

Child Behavior Variables	*1*	*2*	*3*	*4*
1. Approval-seeking from adults		.41	.16	—.11
2. Emotional support-seeking from adults			.72	—.32
3. Help-seeking from adults				—.32
4. Amount of achievement efforts				

Table 1 presents relationships among the nursery school children's free-play behaviors. The correlations reported in this and subsequent tables are rank difference correlations. For an N of 30 a correlation of .306 is required for the .05 level of significance and a correlation of .432 for the .01 level. Table 1 indicates a general trend for the three dependency behaviors—help-seeking, support-seeking, and approval-seeking—to be positively related to each other and negatively related to achievement efforts. This was especially evident for help-seeking and emotional support-seeking. At this age, then, the high achieving children were less dependent on adults than were children who displayed fewer achievement efforts. Independence from adults and amount of achievement striving were positively correlated in the children's nursery school free-play behaviors.

Generality of the children's behavior. The children's behaviors were separately rated as they interacted with their mothers in their homes and with the adult staff (all of whom were females) in the Fels Institute's Nursery School. Table 2 presents the relationships of the children's home behaviors and nursery school behaviors. In all instances the relationships were moderately positive, with three of four associations attaining statistical significance. By nursery school age, as measured in the present study, moderate but demonstrable consistencies in the children's behaviors from the home environment to that of the nursery school were observable. Children who behaved dependently with their mothers also tended to make dependent overtures toward the Nursery School Staff. And children who exhibited many

TABLE 2

RELATIONSHIPS OF THE CHILDREN'S BEHAVIOR WITH THEIR MOTHERS IN THE HOME AND THE CHILDREN'S BEHAVIOR WITH FEMALE ADULTS IN THE NURSERY SCHOOL

Child Behavior Variables	*Rho*	*p*
1. Amount of help-seeking	.33	.05
2. Amount of emotional support-seeking	.27	*ns*
3. Amount of approval-seeking	.34	.05
4. Amount of achievement efforts	.43	.01

achievement efforts in their homes tended to display similar behavior in the nursery school. Whether the generality of these behaviors increases with age—as was found to be so, for example, in a previous study by the authors for children's social compliance (2),—remains an unanswered question.

Maternal behaviors associated with rewarding children's achievement efforts. What were the characteristic maternal behaviors which differentiated the mothers who frequently rewarded their children's achievement efforts from those of mothers who were less prone to do so? Table 3 provides information for this question. First, there was a trend, though non-significant, for the mothers who often rewarded their children's achievement efforts to be less affectionate than the mothers who were less rewarding of achievement efforts. Thus, it is apparent that positive maternal reactions to the children's achievement efforts were *not* a part of, or associated with, a general expression of maternal affection. If anything, the opposite was true. Second, mothers who frequently rewarded achievement efforts were less nurturant toward their children; they were less acceptant and rewarding of help-seeking and emotional support-seeking overtures. Or put another way, the mothers who rewarded achievement efforts were less apt to reward dependent behaviors. Independence training and the rewarding of achievement, then, were positively related. This constellation of maternal

TABLE 3

RELATIONSHIPS AMONG MATERNAL REACTIONS

Maternal Reaction Variables	*1*	*2*	*3*	*4*	*5*
1. Rewarding achievement efforts		—.26	—.36	—.72	.40
2. General affectionateness			.82	.57	.35
3. Rewarding emotional support-seeking				.67	.29
4. Rewarding help-seeking					—.03
5. Rewarding approval-seeking					

reactions was very similar to that found in the children's observed behaviors in the nursery school (cf. Table 1). Maternal rewards of children's achievement efforts were negatively associated with rewarding dependent overtures; children's achievement efforts outside the home were also negatively related to their dependent overtures toward other adults. Finally, the mothers who rewarded their children's achievement efforts when the children did not seek approval also rewarded the approval-seeking overtures of their children. It should be noted that the relationship between the mothers' rewarding of approval-seeking and achievement efforts was positive while the associations between their reactions to approval-seeking *vs.* help- and support-seeking were negative. These findings suggest that middle-class mothers may react to their children's approval-seeking as a part of achievement development rather than as an aspect of dependency. An analysis of the mothers' reactions as determinants of the children's achievement behaviors should elucidate this possibility.

Maternal behaviors as determinants of children's achievement development. Several dimensions of parental behavior have been suggested as possible antecedents of children's achievement development. The present study assessed three of these: (a) maternal affection-rejection, (b) independence training, and (c) maternal reactions to achievement behaviors. Two recent studies of young adults reported by McClelland (5) indicate that parental affection-rejection may influence the development of achievement motivation. One of these investigations employed male high school students as subjects; a second used male college students. In both studies ratings of achievement preoccupation reflected in the subjects' stories to TAT-like pictures were used as indices of achievement motivation. In both studies the subjects also rated their parents in respect to a number of personality variables. In the college student study the high *n* achievement boys rated both their father and mother as more rejectant than the low *n* achievement boys. In the second study, however, high school boys with high achievement motivation rated their fathers as less rejectant than did the low *n* achievement boys (mothers were not rated in this study). The results of these two studies, then, were contradictory; yet both found parental affection-rejection to be predictive of the subjects' achievement motivation. It will be noted that the data of both studies were based on subjects' ratings of their parents' behaviors. These reports may or may not have been congruent with the parents' actual behaviors. The present study provides the opportunity to assess relationships of *observed* maternal reactions and young children's achievement behavior. Table 4 presents relationships between the children's achievement efforts in the nursery school and several maternal reactions to the children's behaviors. There is no clear-cut evidence that maternal affection was associated, either positively or negatively, with the children's achievement behaviors. Contrary to previous research findings, general maternal affection did not appear to be a significant determinant of the children's achievement behavior.

TABLE 4

RELATIONSHIPS OF MATERNAL REACTIONS AND AMOUNT OF CHILDREN'S ACHIEVEMENT EFFORTS IN NURSERY SCHOOL FREE-PLAY

Maternal Variables	*Rho*	*p*
1. Amount of maternal affection	.17	*ns*
2. Rewarding help-seeking behavior	—.19	*ns*
3. Rewarding emotional support-seeking	.11	*ns*
4. Rewarding approval-seeking	.43	.01
5. Rewarding achievement efforts	.42	.01

Independence training has also been suggested as a factor in children's achievement development. Winterbottom (8) found that mothers who reported starting independence training at an early age had children with high achievement motivation. Winterbottom also found that the children's achievement motivation, as reflected in their TAT stories, was positively correlated with teachers' ratings of certain aspects of the children's achievement behavior such as expressed pleasure in success and the amount of achievement motivation exhibited in schoolwork. However, direct relationships between maternal reactions and the children's achievement behaviors were not assessed. Whether independence training is a predictive antecedent of achievement *behavior* is still an unanswered question. In the present study maternal reactions to two dimensions of child behavior, help-seeking and emotional support-seeking, are relevant to this question. It is reasonable to assume that mothers who frequently reward these behaviors are fostering general dependence and lessening possibilities of independence development. What relationships existed between the mothers' reactions to their children's help-seeking and emotional support-seeking overtures and the children's achievement efforts outside the home? Table 4 provides relevant data. Neither maternal reactions to the children's help-seeking nor to the children's emotional support-seeking were predictive of the children's achievement efforts in nursery school free-play. Thus, no demonstrable association was evident between independence training, as measured in the present study, and the children's achievement behavior. This, of course, does not preclude the possibility that aspects of independence training other than those investigated may be predictive of children's achievement development. For example, the present investigation was limited to maternal reactions to children's *dependent* overtures; it did not assess maternal reactions to the children's independence efforts as a predictor of achievement development. Nor can we generalize beyond independence training as measured in the study and free-play achievement behavior. Research by Sontag *et al.* (7), for example, found "emotional independence from parents" to be correlated with young children's intellectual achievement behavior as measured by

standard intelligence tests. When children whose IQs increased during the preschool period were compared with those whose IQs decreased, the former were found to have significantly greater emotional independence from parents than the latter. In the present study, however, independence training *per se* did not predict free-play achievement efforts. There was some evidence in the study that one aspect of independence training was *indirectly* related to achievement behavior. The children of the mothers who often rewarded help-seeking sought help more frequently in the Nursery School (rho .31, significant at the .05 level of confidence). And, as previously discussed, a significant inverse relationship was found between help-seeking and amount of free-play achievement efforts.

If neither maternal affection nor maternal reactions to dependence were predictive of young children's achievement behavior, what other maternal reactions might influence the development of achievement striving? A final, and most likely, possibility is that *direct* maternal rewards of children's achievement behaviors are predictive of the children's achievement striving outside the home. Variables 4 and 5 in Table 4 are relevant here. These data indicate that the mothers who reacted positively to their children's approval-seeking in the home had children who exhibited more achievement efforts in free-play. Also, the mothers who more often directly rewarded their children's achievement efforts when the children did not seek approval for their performances had children who displayed strong achievement striving outside the home. Thus, direct positive maternal reactions to children's achievement behaviors were found to be predictive of young children's achievement behaviors in nursery school free-play while less direct maternal reactions such as general affection and the rewarding of dependence were not.

Summary

The investigation was concerned with correlates and antecedents of young children's achievement behavior. Thirty nursery school-age children and their mothers were studied. The children were observed in nursery school free-play and rated for (a) amount of achievement efforts, (b) help-seeking from adults, (c) emotional support-seeking from adults, and (d) approval-seeking from adults. The children were also observed in their homes in interaction with their mothers and rated on the same four variables. Finally, the mothers' reactions to the children's behaviors were assessed. Analysis of associations between these three sets of ratings produced the following results: (a) High achieving children were less dependent on adults for help and emotional support. (b) The children's behaviors were moderately, but demonstrably, consistent from home to nursery school. (c) Mothers who frequently rewarded achievement efforts were less nurturant but no more or less affectionate than mothers who were less prone to do so. (d) Neither maternal affection nor independence training was

predictive of the children's achievement behavior while *direct* maternal rewards of achievement efforts and approval-seeking were.

References

1. Atkinson, J. W. (Ed.) *Motives in fantasy, action and society.* New York: Van Nostrand, 1958.
2. Crandall, V. J., Orleans, Sonya, Preston, Anne, & Rabson, Alice. The development of social compliance in young children. *Child Develpm.,* 1958, 29, 429-443.
3. Crandall, V. J., & Rabson, Alice. Children's repetition choices in an intellectual achievement situation following success and failure. *J. genet. Psychol.,* in press.
4. Kagan, J., Sontag, L. W., Baker, C. T., & Nelson, Virginia. Personality and IQ change. *J. abnorm. soc. Psychol.,* 1958, 56, 261-266.
5. McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. *The achievement motive.* New York: Appleton-Century-Crofts, 1953.
6. Rosen, B. C. The achievement syndrome: a psychocultural dimension of social stratification. In J. W. Atkinson (Ed.), *Motives in fantasy, action and society.* New York: Van Nostrand, 1958. Pp. 495-508.
7. Sontag, L. W., Baker, C. T., & Nelson, Virginia. Mental growth and personality development: a longitudinal study. *Monogr. Soc. Res. Child Develpm.,* 1958, 23, No. 2 (Whole No. 68).
8. Winterbottom, Marian. The relation of need for achievement in learning experiences in independence and mastery. In J. W. Atkinson (Ed.), *Motives in fantasy, action and society.* New York: Van Nostrand, 1958. Pp. 453-478.

RELATIONS BETWEEN PARENT MONEY EDUCATION PRACTICES AND CHILDREN'S KNOWLEDGE AND USE OF MONEY[1]

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PROBLEM

This research explored aspects of the widely held assumption that specific money education practices of parents affect children's knowledge and use of money. Recommendations on how to help children learn about money are made in current child development texts (13, 20), money management texts (6, 21), and bulletins prepared for mass distribution (2, 8, 14). Yet there is no research evidence to support these recommendations as recipes for money education. Research studies in this area of knowledge have been limited to surveys of parent practices and children's knowledge and use of money (4, 5, 12). For the older adolescent ages, there is one early attempt to find relations between experiences with money (9) and a study of relations between parent money education practices and scores of high school seniors on test of adjustment and self-reliance (18).

This project was originally given financial support as a survey study. It was changed early in the data collection phase into a study of relations

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[1] The investigation reported in this paper is Project 502 of the Kentucky Agricultural Experiment Station and is published by permission of the director.

In its first year, this study was a subproject of Southern Regional Project S-20, planned by the following agricultural experiment station representatives: Alabama, Ruth Albrecht; Arkansas, Eleanor Barnes; Georgia, Irvin V. Sperry; Kentucky, Statie Erikson; Louisiana, Clara Tucker; Mississippi, Dorothy Dickins; North Carolina, Katherine Roberts; Oklahoma, Lela O'Toole; Tennessee, Mary Elizabeth Keister and Harold Holloway; Texas, Bardin H. Nelson; and Virginia, Mildred Tate. Credit for the survey sampling design adopted by this group belongs to Harold Holloway of Tennessee. The Kentucky project was changed into its present form in 1956 when the senior author assumed responsibility for completion of the project. Lucille Magruder participated in regional plans and in Kentucky data collection from 1954 through 1958.

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between parent practices and children's behavior because the survey data appeared adequate, with one addition, to test aspects of the following typical recommendations for parents:

1. If children are given wide experience in the use of money, they will have more knowledge of money and its use than children lacking such varied experience.
2. Children will have more knowledge of money use if they are given money to spend.
3. It is not the amount of money given to the child, but the way the money is used that determines whether the child will gain knowledge from the experience.
4. Children will have more knowledge of money use if their parents give them an allowance.
5. If children are given allowances, less of the family's money, rather than more, will be taken for children's spending money.
6. Children will have more knowledge of the use of money if they save money.
7. If children are given opportunities to earn money, they will have more knowledge of money use than children lacking this experience.
8. Children will have less knowledge of money use if money is used to reward or punish their behavior.
9. Children learn through spending money foolishly, and, as they grow older in years and experience, will spend money more wisely.
10. Children will have the attitudes about the importance of money and material things that are expressed by their parents.
11. Children will have more knowledge of and experience with money if their parents' attitudes are money-centered.
12. Children will have more knowledge of and experience with money if their parents handle the family income wisely (follow practices recommended by money management specialists).

The earlier survey studies did not develop measures that could be used to test these recommendations. Such measures had to be developed from the interview data of this project. Hence, a second purpose of this research was to demonstrate the usefulness of scores used to test aspects of the recommendations. This purpose required investigation of the relations of age of the child, IQ of the child, education of the mother and father, and socioeconomic status of the family to scores estimating children's knowledge and use of money and to parent use of specified practices. If it could be demonstrated that the money education scores had the positive linear relations usually found between these variables and measures of educational achievement and experience, the scores would be considered as useful for tests of specific recommendations. Relations between the scores and the following variables were investigated for this purpose also: sex of child, number of siblings, age of parents, classification of the type of soil found in the county of residence, employment of the mother away from home, farm vs. nonfarm residence, whether or not the father could be classified as a farmer, and, if so, whether

the father was a full- or part-time farmer, and whether or not the parents owned the farm. Evidence is either contradictory or nonexistent on the relations between these variables and measures of educational achievement and experience.

Method

The procedures for selection and interviewing of children and parents were those developed (with two exceptions) in the years 1953-1955 by an interstate planning committee for Southern Regional Family Life Project S-20.[2] The major responsibility for preparation of interview questions was carried by Dorothy Dickins, a research worker in family economics and money management at the Mississippi Agricultural Experiment Station. She has described selection and interview procedures in detail in a report of their use in a survey conducted in Mississippi (4), so these procedures will be described only briefly in this section. Most scoring scales for interview answers of children and parents and an additional test were developed in the Kentucky investigation.

The Sample and Population

The sample and population of families were determined by criteria for selection of children rather than of parents or of families. The 512 rural children of the sample resided in the Blue Grass region of Kentucky. There were 64 boys and 64 girls at each of the ages of 7, 8, 11, and 12 years. They resided in eight counties, selected at random from eight levels of a soil type classification of 36 Blue Grass counties by a United States Department of Agriculture statistician, Earl E. Houseman. In each county the children attended two consolidated county system schools selected by the county superintendent[3] as representative of that county. Eight children were selected from these two schools, proportionally to the school enrollment, for each of the eight sex and age levels. Selection was at random from lists of all children of that age and sex enrolled in the two schools in the six counties in which data were collected in 1956-1957. This is one of the two procedural exceptions to regional plans. In the two counties sampled in 1955, children were selected by the "randomized method" chosen by the regional committee. Child selections were discarded and another name drawn if, before the parent interview, it was discovered that the family did not meet these additional population criteria: the child and both parents resided in the

[2] Committee members were Dorothy Dickins and Virginia Ferguson of Mississippi, Lucille Magruder of Kentucky, and Bardin H. Nelson of Texas. The surveys planned by this committee were projects of the agricultural experiment stations in these three states. The Texas survey is now at the manuscript preparation stage.

[3] Valued assistance was given to this project by the county superintendents and the principals and teachers in schools in the following counties: Bath, Clark, Garrard, Jessamine, Kenton, Nelson, Robertson, and Woodford.

same dwelling in a 1950 census definition rural area, were of the white race, and had been born in the United States.

The sample of interviewed parents included either the father or the mother of 493 of the sample children. The parent was interviewed at home within two months after the interview of the child at school. Interviews were completed with 484 different parents, since six of the 230 fathers and three of the 254 mothers had two children selected for the sample. The failures to complete interviews with 19 parents were for five reasons: (a) the interviewer was unable to find either parent in three or more attempts (13 families); (b) direct refusal (two families); (c) separation of the parents in the time since the child interview (two families); (d) one child had not known his mother was born in Canada; and (e) one father was judged to be too intoxicated for the information he willingly furnished to be considered reliable.

The sample of families covered the widest possible range of socioeconomic status variables, and many families were found at every level between the extremes. Education of the father ranged from no years at school (six fathers) to the Ph.D. or M.D. level (three fathers). Mothers' years in school ranged from one (one mother) to 17 (two mothers), and 17 mothers had 16 school years or a bachelor's degree. The low extreme in housing consisted of shacks, unpainted inside and out, that lacked all modern conveniences, including window screens. At the high extreme in housing were the mansions of Blue Grass horse farms. There were at least two dozen children from families of inherited wealth and social position, many children whose fathers earned $3.00 a day as farm labor for the livestock or tobacco crop, and a few whose fathers had been unemployed for some time. As indicated by the fact that 147 families owned farms in this most productive agricultural area of Kentucky, there were also many children reared on the "support a single family" type of farm that can be found almost anywhere in the United States. The majority of the 186 fathers with full-time nonfarm employment were engaged in semiskilled or unskilled occupations. Sixty-eight per cent of the families lived on farms, and the remainder lived in small towns or the unincorporated fringe areas of small cities.

In another descriptive aspect the sample was remarkably homogeneous. There were only three family names that were not of British Isles origin. This characteristic was not affected by the fact that many farm tenants and laborers had recently migrated to the Blue Grass area from the hill regions of Kentucky.

Interview Methods

Children were interviewed at school, during school hours, in a small room or office made available to the investigators by school principals. The interview began with the questions concerned with the population criteria. Then, children were asked the questions prepared by the regional committee exactly as they were mimeographed on the six pages of the interview schedule and in the same order. Interview questions asked for specific answers on

the child's attitude toward material things, how the child received money, how much was received and how it was used, their experiences making decisions about and purchasing their own clothing, their part in family decisions about purchases, and their experiences in saving money. Interview forms differed for the two sexes only in three story examples used as the basis for a few questions. In the six counties interviewed in 1956-1957, children were then administered the coin test of knowledge of money use developed for this project by the first author. The addition of this test was the other exception to interview plans of the regional committee. Child interviews took from 15 minutes to half an hour to complete, depending on the talkativeness of the child. The children appeared to enjoy the interview experience and to value the prestige of being one of the few selected from their class.

The second author did all the child interviews in five and a half counties. The first author interviewed the children in the remaining two and a half counties. Child interviews were completed in one school and one county before the investigator began interviews elsewhere. In two counties child and parent interviews were conducted in the spring and summer months of 1955. Interviews in the other six counties were completed in the time period from December, 1956, to July, 1957.

Parent interview questions tried to determine family practices in the following areas of money management: planning the use of the family income, decisions for and selection of purchases, control of the family purse, the use of banks and commercial financing, financial records, provisions for the future, talking to children about money, use of money to reward and punish children's behavior, attitudes toward the importance of money, and family income. The interviewer checked housing conditions on the 10-item Belcher-Sharp Socioeconomic Scale (1). Information on parent and family composition and characteristics was obtained. The parent interview did not include any check of the child's statements regarding experience. Interviewers found it took about 45 minutes to complete and record an interview on the 11 pages of the schedule.

Parent reports of family income were not used in this investigation. Interviewers noted on many forms that families were reporting several thousands of dollars less income than possible for the manner of living. Additionally, inspection of interview data indicated much discrepancy between income and either housing level or provision for the future.

The local residents who interviewed most of the parents were individuals with both prestige and wide acquaintance among the farm families in that county.[4] Men interviewers were a school principal, two vocational agriculture teachers, a president of the county extension service council, and

[4] The following individuals conducted parent interviews: W. S. Avelar, Gaynor Caldwell, Lorraine Dieken, Audra N. Dryden, William Faulkner, Virginia Jennings, Harold Miller, William H. Parrott, Beulah N. Ross, and William R. Tudor.

two high school special subject teachers, one of whom had wartime experience as a C.I.D. investigator. Women interviewers were a third grade teacher and three former extension agents who had married and settled in the county. All interviewers were given procedural training by the investigators. Each interviewer tried to schedule equal numbers of mothers and fathers at each child age and sex level. About the same number of interviews were conducted by local men as by local women in the six counties investigated in 1956-1957. The second author interviewed parents in two counties in 1955, and both investigators did check interviews in the other counties. Failure to find parents occurred less often for local interviewers (two failures in six counties) than for the investigators (11 failures in two counties).

Description of Children's Scores

Coin Test of Knowedge of Money Use

The coin test was developed to estimate children's knowledge of the use of money. Children were shown a penny, a nickel, a dime, a quarter, and a half dollar, in that order, and asked to name the coins. Children then were asked, "What will the penny (or nickel, etc.) buy?" in the same coin order. A box of 18 items purchased at dime stores was then placed in front of the child, and he or she was asked to point to one item that a penny (or nickel, etc.) would buy, again in the same order of coins. Only 11- and 12-year-olds were given the fourth part of the test, the pricing of each of the remaining 13 items in the box.

The dime store items included three costing a penny (Tootsie roll, sucker, bubble gum), four costing a nickel (plastic soldier, tiny baby doll, bag of marbles, balloon), five costing a dime (comic magazine, ball, jacks, whistle, doll bottle), three costing a quarter (rubber tractor, yo-yo, set of eight barrettes), and three costing 50 cents (jack knife, revolver, girl's purse). Children at all age levels appeared to be familiar with dime store items and to enjoy the pricing game.

The test score was the number of correct answers. The Coin Test 1 score included only the first three parts of the test and had 15 possible points. The Coin Test 2 score included the fourth part of the test and so had 28 possible points. A more complicated score that subtracted half the errors was discarded when analyses showed relations to age, sex, and the experience with money score did not differ from Coin Test 1 and 2 scores.

Experience with Money Scores

The *experience with money score* was developed to indicate the number of different experiences using money for each child. Children were questioned about a variety of possible experiences during the interview. Two points were contributed to the child's score for each of the following answers:

1. The child (rather than an adult) usually bought the candy and toys he desired.

2. The child had received spending money (exclusive of lunch money) in the past week and could name the amount.
3. The child gave a detailed description of how he had used the spending money in the past week (one point was given to a partial report).
4. The child brought the money to school to pay for his school lunch or had earned the money at school.
5. The child had at least once chosen between two desired, relatively expensive articles (clothes, books, guns, etc.) and could describe a choice in which the articles differed from those of the interview example. (One point was given when one of the articles was the same as an example item.)
6. The child had at least once helped to select an article of his clothing and could describe the article and selection.
7. The child had at least once purchased a gift for someone else by himself or with another child. (One point was given if an adult helped.)
8. The child had at least once participated in family talk about the purchase of expensive family items, such as TV sets or furniture, and could name the item.
9. The child at some time had saved for a named item at least three times as much money as he had available to spend in the past week.

Only one point was given to the following answers because they either were added facets of the experiences above or were not easily possible experiences for all children.

1. The child's contribution to the Sunday school collection came from spending money received for other or all purposes or from money earned by the child.
2. The child at some time had bought a movie ticket at the ticket window or had used his spending money or earnings to pay for a ticket.
3. The child had run the errand of purchasing small items for family use at a grocery store at least once.
4. The child had charged some item at a store at least once.
5. The child had participated in the store selection of the item described in (8) above.
6. The child was currently saving an amount of money three times that received as spending money in the past week.
7. The child's current savings were in a bank in town.

As these lists indicate, the possible high score was 25 points. Zero scores were possible, but one point was the low obtained score.

Spending Money in the Past Week

The amount of money the child had available to spend in the past week, excluding lunch money, was used as given, regardless of its source (given by parents to spend, earned, saved, a gift from relatives, etc.). Children also were classified as "lacked spending money" or "had spending money" in the past week.

Gifts and Earned Money in the Past Year

Children were asked specific questions on how much money they had received in the past year for working at home, for working for grandparents, uncles, or other relatives, for working for people not related to the child, for selling things (named), for making good grades or passing, and as gifts from grandparents, older brothers and sisters, etc. The sum of the amounts listed by the child was called "gift and earned money in the past year." This sum was obtained only for the six counties interviewed in 1956-1957, because questions about grade and gift money were not asked in the other two counties.

Materialistic Attitudes

A scale to classify children as having materialistic or nonmaterialistic attitudes was developed in regional plans and is described elsewhere (4, pp. 6 and 35). Questions asked were: (a) whether Susie (Paul) should get anything for saving little brother from being run over by a car, and what should be received or why nothing should be given; (b) for three wishes of the child; and (c) what kind of job the child wanted when grown up and why. No credit was given for material answers, one point was given for debatable answers, and two points were given for nonmaterial answers. Those scoring fewer than six points were classed as materialistic, and those scoring from six to ten points as nonmaterialistic.

Description of Parent Scores

Recommended Practices Scores

The *recommended practices scores* estimated the degree to which parents followed practices generally recommended for family money management by specialists in family finance. Parent interview questions covered a variety of family financial practices and were prepared by a specialist in money management. Points assigned in this investigation to areas of money management varied as follows:

1. Planning expenditures, 2 to 15 points. More points were given for (a) a written plan, (b) covering most expenditures, (c) planned by all family members, (d) that was acceptable and was followed.
2. Decision making on specific items purchased, 1 to 12 points. Points increased as more family members shared decisions on expensive items, but chose their own inexpensive items.
3. Control of family purse, 4 to 7 points. More points were given for joint control and trusting marriage partner.
4. Use of banks and commercial financing, 0 to 12 points; three points each for use of a checking account and of a charge account and for not making installment payments (except on houses or farms) or using lay-away plans.
5. Financial records, 0 to 7 points; five points for complete written records; three points for partial records. Two points were added when more than one person kept records.

6. Provision for the future, 0 to 9 points; three points each for life insurance on father, for insurance on property, and for any and all investment and capital outlay.
7. Reward and punish with money, 10 points; five points for no use of each aspect; two points for occasional use of each aspect.
8. Talk to children about money, 2 to 5 points. Children accounted for their use of spending money to parents (two points) or not (three points). Parents often (one point), sometimes (two points), or never (zero points) talked to children about costs. The point range for this area is small because (a) further details or check questions were not asked in this area, as they were in other areas, and (b) parents were obviously uncertain about all possibilities except "Never."

Scores could range from nine to 77 points. The obtained range was from 24 to 73 points. The mean score was 51.3 points with a standard deviation of 9.7 points.

Money-Centered Attitudes

A test was developed by the regional committee to estimate the importance of money to the father and mother. Parents were asked to evaluate the following seven statements:

1. If we were really honest with ourselves, we would have to admit that money is the most important thing in life.
2. Wanting more money really keeps many of us from enjoying the more worthwhile things of life.
3. Chances for a happy life are pretty slim if you have just enough money to live on.
4. About the only way we can do good is through use of money or things money can buy.
5. It is only natural to look up to a man who has made a lot of money.
6. I often wish I had as much money as some rich person I know.
7. I worry about money all the time.

Evaluation was by oral agreement with one of four answers: That's very true, That's a little true, That's a little wrong, or That's very wrong. Points assigned to these answers were one, two, four, and five, respectively. The sum of these points was used as the money-centered attitude score in this investigation. The average parent evaluation of the seven statements was 24 points, or within the "That's a little wrong" range.

Parents also were dichotomized as "money-centered" and "nonmoney-centered" by a Guttman type scaling procedure described in the report for the Mississippi survey (4, pp. 6 and 35-36). The scaling for the dichotomy omitted statements 2 and 7 and labeled "That's a little true" as nonmoney-centered for statements 4 and 6.

Results on Usefulness of Child and Parent Scores

One purpose of this project was to demonstrate the usefulness of measures of children's knowledge and use of money and of parent practices. The

primary purpose of the project, to test recommendations for parents on money education of children, depended on this demonstration because measures to test aspects of the recommendations had to be developed in this investigation. Usefulness was demonstrated by statistical tests of the relations of child and parent money education scores to the variables that have been related to other measures of educational achievement and experience. This section presents the results of these statistical tests.[5]

TABLE 1

AGE MEANS AND STANDARD DEVIATIONS FOR COIN TESTS 1 AND 2 AND EXPERIENCE WITH MONEY SCORE

	Coin Test 1			Coin Test 2			Experience with Money		
Age	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*
7 years	96	10.9	2.3				128	13.0	5.0
8 years	96	11.8	1.8				128	15.6	4.7
11 years	96	13.0	1.1	91*	20.3	2.3	128	18.1	5.4
12 years	96	13.6	.9	96	21.0	1.6	128	19.9	4.6
	384			187			512		

* In the first county tested, four boys and one girl, aged 11 years, were tested before the decision was made to give all 11- and 12-year-olds the fourth part of the test.

Relations for Children's Knowledge and Use of Money Scores

Age and Sex of Child

Scores on both the short and long forms of the coin test of knowledge of money use increased as the age of the child increased, as is shown in Table 1. Age differences were significant beyond the .001 level in an age by sex by county (levels) analysis of variance (15). The mean difference between 7- and 8-year-olds was significant at the .01 level by *t* test, and the mean difference between 11- and 12-year-olds was significant at the .05 level. Scores did not differ with sex of the child or with the soil type level of the county. Neither double nor triple interactions were significant in the levels analysis of variance.

Experience with money scores also increased as the age of the child increased, as is shown in Table 1. Age differences were significant beyond the .001 level, but there were no sex differences, for the sample or in age

[5] Scoring and machine computations were facilitated by the work of three graduate assistants, Joann Atcher, Rachel C. Graves, and Hazel McCrary, and these undergraduate students: Mary Robert Barger, Alice Evenburgh, Dixie Grugin, Lynne Santen, Ruth Ann Thornton, and Betty Young.

groups, in an age by sex by county (replications) analysis of variance (15). All age differences in scores were significant beyond the .01 level by *t* tests. The random replications analysis of variance was used because county differences at the various age and sex categories (or double and triple interactions) precluded tests of over-all difference in the levels analysis of variance attempted first. County interactions were present regardless of whether only the six 1956-1957 counties or all eight counties were used in analysis of variance. The county differences were not associated (rank order correlation) with the soil type classification of the county.

TABLE 2

PERCENTAGE OF CHILDREN IN AGE AND SEX GROUPS GIVEN SPENDING MONEY IN PAST WEEK, MEAN AMOUNTS GIVEN, STANDARD DEVIATIONS, AND UPPER LIMITS OF THE RANGE

	BOYS				GIRLS			
Age	%	*M*	*SD*	*u*	%	*M*	*SD*	*u*
7 years	48	$0.46	$0.49	$2.00	67	$0.28	$0.26	$1.00
8 years	72	0.55	0.79	4.00	77	0.39	0.48	3.00
11 years	85	0.61	0.65	3.30	84	0.82	0.99	5.00
12 years	92	0.96	1.06	6.00	87	0.85	0.67	3.00

Individual variation within age groups in the amount of spending money for the past week was so great that no group differences could be significant. Even when children given no money were excluded, the standard deviation exceeded the mean amount of spending money in six of the eight sex and age groups, as shown in Table 2. The positive skew in all distributions is indicated by both the standard deviations and the upper limits of the range. The table suggests an increase in mean amount of spending money with age and that girls received less spending money than boys.

The number of children given money to spend in the past week increased with age. This relation was significant at the .001 level for boys and at the .05 level for girls by χ^2 tests of independence. More girls were given spending money than boys at the age of 7 years (.01 level), but sex differences were not significant at the other ages.

Most children had earned or been given money as a present in the past year, as is indicated by the percentages listed in Table 3. Individual variation in the amount of money the children had received was exceedingly large. The largest of the upper limits of the range given in Table 3, that for 12-year-old boys, is 3286 times the lower limit at that age of $0.10. The lower limit of all other ranges was zero, excepting that of $0.50 for 11-year-old boys. Age differences in mean amount of gift and earned money were very small compared to the variation within age groups.

TABLE 3

PERCENTAGE OF CHILDREN IN AGE AND SEX GROUPS RECEIVING GIFT AND EARNED MONEY IN THE PAST YEAR, MEAN AMOUNTS, AND UPPER LIMITS OF THE RANGE

	BOYS			GIRLS		
Age	%	*M*	*u*	%	*M*	*u*
7 years	87	$ 4.34	$ 60.25	92	$ 4.12	$ 56.50
8 years	96	7.37	113.00	98	4.78	36.00
11 years	100	18.94	123.30	98	14.34	83.00
12 years	100	53.65	328.60	94	21.37	281.00

A reward for making good grades or for passing a grade in the past year had been given to 35 per cent of the children. By χ^2 tests, there were no age or sex differences in the number of children receiving this reward. However, 69 7- and 8-year-olds received an average of $1.03 and 66 11- and 12-year-olds received an average of $2.03 as a school achievement reward.

The number of children receiving money as a gift (70 per cent) did not differ by age or sex in χ^2 tests. The average gift amount was $1.47 at 7 years and $3.99 at 12 years.

As is evident from the immediately preceding analyses, earned money had to account for the relatively large mean amount of money listed in Table 3 as received by 11- and 12-year-olds. Mean amounts earned by the children who reported earning money are presented in Table 4. The table suggests that amount increased with age although, of course, no tests were significant. χ^2 tests indicated that the relationship between age and number of children working was significant beyond the .01 level, and that there were no sex differences in number working.

The materialistic attitudes test and scoring scale were developed in regional planning and were shown to relate to age of the child and to socio-economic status in the Mississippi survey (4, pp. 7 and 27). The relation to age was significant and in the same direction in Kentucky. About 80

TABLE 4

PERCENTAGE OF CHILDREN IN AGE AND SEX GROUPS EARNING MONEY IN THE PAST YEAR AND MEAN AMOUNTS EARNED

	7 YEARS		8 YEARS		11 YEARS		12 YEARS	
Sex	%	*M*	%	*M*	%	*M*	%	*M*
Boys	70	$3.29	86	$5.60	89	$18.04	97	$53.98
Girls	72	4.02	87.5	3.07	84	13.69	89	18.01

per cent of the 7- and 8-year-olds expressed materialistic attitudes while nonmaterialistic attitudes were expressed by 67 per cent and 58 per cent of the 11- and 12-year-olds in Kentucky and Mississippi, respectively. There were no sex differences in either state.

IQ of Child

School records in three counties furnished IQs from the California Mental Maturity Test or the Otis Self Administering Test of Mental Ability for 107 of the children in the sample. The average *r* of age level correlations between Coin Test 1 scores and IQs was .23, significant beyond the .05 level. Knowledge of money use, then, related linearly and positively to IQ for these children. The average *r* between experience with money scores and IQs was .18 and was not significant.

Education of Parents

As was described earlier, the range for years of education was the widest possible for fathers (0 to 19 years) and only slightly less wide for mothers (1 to 17 years). This parent range was unusually adapted to the investigation of correlations of education of parents with the children's knowledge and use of money scores, since use of the complete range increases the possi-

TABLE 5

AVERAGE CORRELATIONS OF PARENTS' YEARS IN SCHOOL AND CHILDREN'S KNOWLEDGE AND USE OF MONEY SCORES IN AGE AND SEX GROUPS

	BOYS			GIRLS		
Test and Age	*Father*	*Mother*	*Midparent*	*Father*	*Mother*	*Midparent*
Coin Test 1						
7–8 years	.17	.22*	.21*	.17	.30**	.24*
11–12 years	.00	.04	.04	.07	.17	.18
Coin Test 2	.03	.06	.01	.06	.18	.11
Experience with Money (all ages)	.31**	.34**	.37**	.23**	.33**	.28**
Week's Spending Money						
7–8 years	.08	—.10	.04	—.02	—.09	—.09
11–12 years	.21*	.10	.04	.21*	.14	.17
Year's Gift and Earned Money						
7–8 years	.00	.01	.01	.07	.10	.10
11–12 years	.18	.05	.16	.31**	.37**	.37**

* Significant beyond .05 level.
** Significant beyond .01 level.

bility of finding relations with other variables. Mothers averaged more years in school (9.3) than fathers (8.4) and the standard deviations were 3.1 and 3.7 years respectively.

Significant, positive *rs* between education of parents and scores on the coin tests of knowledge of money use occurred only for 7- and 8-year-olds, as is shown in the first three lines of Table 5. Although the *rs* between scores and fathers' education are not significant in the sex split of younger children in Table 5, the average *r* (.17) was significant when both sexes were combined ($N = 178$).

The significant correlations between parents' education and experience with money scores shown in Table 5 demonstrate a positive linear relation for this sample of families.

The education of the father was positively and significantly related to the amount of spending money for the past week of 11- and 12-year-old children. The significant *rs* between the gift and earned money for the past year of 12-year-old girls and education of parents are the largest in Table 5, but the similar correlations for older boys were not significant. These correlations suggest that the amount of money given to children is related to education of parents only at the older ages in the sample range of children's ages.

Socioeconomic Status

The level of housing, furnishings, and equipment of the 484 families varied within the entire range from 27 to 56 points of the Belcher-Sharp Socioeconomic Scale (1). Many families were found at both extremes. The mean score was 46 with a standard deviation of 7.7 points.

The coin tests of knowledge of money use related to this measure of socioeconomic status only in the group of 7- and 8-year-old girls, as is shown in Table 6. The experience with money score correlated positively and sig-

TABLE 6

AVERAGE CORRELATIONS BETWEEN BELCHER-SHARP SOCIOECONOMIC SCALE AND CHILDREN'S KNOWLEDGE AND USE OF MONEY SCORES IN AGE AND SEX GROUPS

	Boys		Girls	
Test	*7–8*	*11–12*	*7–8*	*11–12*
Coin Test 1	.10	.02	.28**	.02
Coin Test 2		.12		.09
Experience with Money	.26**	.28**	.24**	.31**
Spending Money	—.24**	.05	.17	.07
Gift and Earned Money	.04	.18	.23*	.28**

* Significant beyond .05 level.
** Significant beyond .01 level.

nificantly at all age levels with this level of living scale. The *r*s between these scores, shown in Table 6, are similar in size to those obtained for this child score and education of parents.

The only *r*s between the week's spending money and socioeconomic status that were significant were for 7- and 8-year-old boys, and these *r*s were negative. For girls of all ages, the year's gift and earned money correlated positively with Belcher-Sharp scores. This correlation did not occur for boys, as is shown in Table 6.

Number of Siblings

The four categories of number of siblings shown in Figure 1 were arbitrarily established to permit study of differences in knowledge and use of money scores associated with number of siblings. As Figure 1 indicates, number of siblings was not associated with differences in scores on the two coin tests of knowledge of money use. Differences were tested by an age

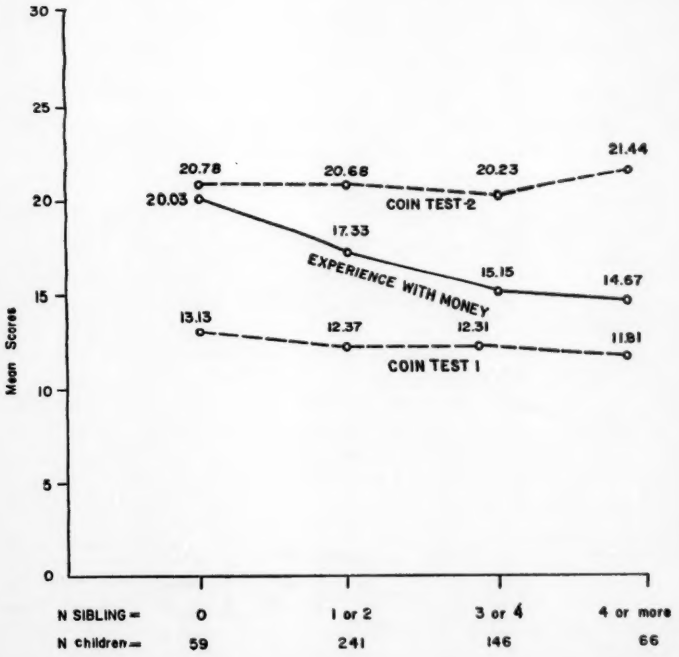

FIGURE 1—Mean Coin Test 1 and 2 and experience with money scores of children in the sibling categories.

groups within sibling categories analysis of variance, using subjects as the unit of analysis (15).

"Only" children reported more experiences with money than children "blessed" with brothers and sisters. For those children with brothers and sisters, the experience with money scores decreased as the number of siblings increased, as is shown in Figure 1. The differences in mean experience with money scores were significant beyond the .001 level in an age groups within sibling categories analysis of variance. Twenty of the 24 score differences between sibling categories at the four age levels were significant beyond the .05 level by *t* tests.

Age of Parents

Product-moment correlations between parents' age (singly and combined) and both coin test scores and experience with money scores were not large enough to be significant for any age or sex group. Additionally, *r*s for the various age and sex groups were not consistent in direction. The 24 *r*s between parents' age and Coin Test 1 scores ranged from −.13 to +.24. The same number of *r*s between age of parents and experience with money scores ranged from −.19 to +.23.

Employment of the Mother

One hundred and twenty (24 per cent) of the mothers had been employed away from home for at least four weeks of the preceding year. Of these mothers, 69 (57.5 per cent) lived on a farm. The number of employed mothers did not differ in the eight children's age and sex groups by χ^2 tests of independence.

Coin test scores of children of employed mothers did not differ from the scores of children of mothers working only at home in an age groups by mother's employment dichotomy analysis of variance.

Children of employed mothers tended to have more experiences with money than children of mothers not employed away from home, and the difference was significant beyond the .001 level in an age groups within mother's employment dichotomy analysis of variance. In six of the eight sex and age groups, the differences in this direction were significant beyond the .05 level by *t* tests. Children of employed mothers had a mean experience with money score of 18.53, while 16.39 was the mean score of children of mothers working only at home.

Farm and Nonfarm Residence

Two thirds (68 per cent) of the rural families in this sample resided on farms. The possible differences in living associated with residence in the open country as compared to residence in small towns or in the outskirts of small cities did not relate to scores on the coin test of knowledge of money use, but were associated with differences in experience with money scores of 7- and 8-year-old children. Nonfarm children of these ages tended

to have experience with money scores that averaged two points higher than scores of farm children. The differences were significant beyond the .001 level for the younger age group in an age groups within the residence dichotomy analysis of variance (used also to test coin test score differences). Nonfarm 7- and 8-year-olds had a mean experience with money score of 15.7, while the mean score of farm children of these ages was 13.6. Similar differences in the same direction were significant beyond the .05 level by *t* tests for each of the four younger age and sex groups. Experience with money scores of 11- and 12-year-olds did not relate to farm and nonfarm residence.

Father's Occupation Dichotomies

Coin test scores and experience with money scores did not differ in any of the dichotomies used to distinguish the occupational status of the father when differences were tested by age groups within father's occupation dichotomy analyses of variance. The dichotomies and the number of fathers in each were as follows:

1. Full- or part-time farmers (307) vs. full-time nonfarm employment (186).
2. Farm owner (147) vs. farm tenant or laborer (160).
3. Full-time farmer (217) vs. part-time farmer (90).

Relations for Parent Scores

The parent recommended practices score had positive, linear relations with education of the parents and with the family score on the Belcher-Sharp Socioeconomic Scale, as is shown in Table 7. For this sample, the degree to which parents followed practices recommended by money management specialists correlated to a larger degree with the level of housing estimate of socioeconomic status of the family than with the years either parent had spent in school. The differences in *rs* were significant beyond the .001 level. No relations were found between the parent recommended practices score and age of parents, either singly or combined.

TABLE 7

CORRELATIONS BETWEEN PARENT RECOMMENDED PRACTICES SCORE AND PARENTS' EDUCATION, AGE, AND BELCHER-SHARP SOCIOECONOMIC SCALE

Test	Education of		Age of		*Belcher-Sharp Scale*
	Father	*Mother*	*Father*	*Mother*	
Recommended Practices Score ...	.32**	.21**	.06	.02	.53**
Belcher-Sharp Socioeconomic Scale	.49**	.52**			

** Significant beyond .01 level.

The regional committee planned to have approximately equal numbers of fathers and mothers interviewed so that data could be obtained for tests of differences in the expression of attitudes about the importance of money. The Mississippi survey reported that 66 per cent of the fathers and 53 per cent of the mothers were classified as money-centered in attitude, and that this difference in proportions was significant (4, p. 19). The difference in proportions was not significant in Kentucky, however. By the same classification scale, 49 per cent of the fathers and 51 per cent of the mothers in Kentucky were money-centered. Additionally, the point scores of Kentucky fathers and mothers did not differ by *t* test.

Tests of the usefulness of money-centered attitudes of parents were not made in this project. The Mississippi survey reported that money-centered parents tended to have fewer years of education and lower socioeconomic status than nonmoney-centered parents.

Summary and Conclusions

Positive, linear relations were found between scores on the coin tests of knowledge of money use and age of the child, IQ of the child, education of parents, and socioeconomic status. Relations with the latter two family variables were limited to children aged 7 and 8 years. Differences in coin test scores were not associated with other variables studied, a usual finding for tests of knowledge.

Experience with money scores also had positive linear relations with age of child, education of parents, and socioeconomic status. Score differences were not associated with IQ of the child, but were associated with additional variables. Children of mothers employed away from home had higher experience with money scores than children of mothers who worked only at home. At the ages of 7 and 8 years, nonfarm rural children had higher experience with money scores than farm children. Number of siblings related negatively to experience with money scores. Experience with money scores differed by age and sex from county to county, but not in accordance with soil type classification of the county. Sex of child, age of parents, and father's occupation categories did not relate to experience with money scores.

Individual differences in the amount of money given the children to spend in the preceding week were so large that no tests of mean differences between age, sex, or other groups could be significant. The number of children given money to spend in the past week increased with age. The amount given the children had some positive correlations with the education of the father at the various age levels, but not with education of the mother or socioeconomic status.

Individual variation in the amount of money received as gifts or earned in the past year also was exceedingly great. Most of the children had received some such money during the past year. For girls, but not for boys, the amount of gift and earned money correlated positively with education of parents and with socioeconomic status.

The parent recommended practices score correlated positively with education of parents and socioeconomic status, and did not relate to age of parents.

Two analyses were made of the usefulness of child and parent attitude scores for the Kentucky sample. One verified the Mississippi finding (4) that children shift from materialistic attitudes to nonmaterialistic attitudes between the younger and older ages of the samples. The other found no difference in the number of fathers and of mothers in Kentucky who expressed money-centered attitudes, although such a difference was found in Mississippi.

It is concluded that usefulness was established by these data for the children's coin test scores and experience with money scores, and for the parent recommended practices scores. While evidence of usefulness of the amount of money received by the child in the past week or year was presented, it was limited to correlational analyses. Extremely large ranges in the amount of money received at all ages preclude tests of group or variable differences in means for this sample of children.

Results of Tests of Recommendations for Parent Money Education Practices

1. *If children are given wide experience in the use of money, they will have more knowledge of money and its use than children lacking such varied experience.*

This recommendation was tested by product-moment correlations of experience with money scores with the coin test scores estimating knowledge of money use. As is shown by the *r*s listed in Table 8, the findings agree with the recommendation. Significant *r*s were obtained for both sexes and at all age levels except 12 years. The *r*s for the other ages are as large as any

Table 8

CORRELATIONS BETWEEN EXPERIENCE WITH MONEY AND COIN TEST 1 AND 2 SCORES

	Coin Test 1			Coin Test 2		
Age	*Boys*	*Girls*	*All*	*Boys*	*Girls*	*All*
7 years	.33*	.40**	.41**			
8 years	.25	.34*	.31**			
11 years	.07	.37*	.28**	.20	.23	.21*
12 years	.07	.24	.15	.15	.07	.12
Average *r*s	.18*	.34**	.29**	.17	.15	.17*

* Significant beyond .05 level.
** Significant beyond .01 level.

obtained in this project when children's scores were correlated with other variables. They indicate a relationship throughout the range of scores, not just for the extreme scores suggested by the recommendation.

2. *Children will have more knowledge of money use if they are given money to spend.*

Children given spending money in the past week had higher scores on the coin test of knowledge of money use than children lacking money to spend in the past week, as is shown in Table 9. This difference was significant beyond the .001 level by an age groups within spending money dichotomy analysis of variance. By *t* tests listed in Table 9, the difference was significant for the younger children, but was not significant for the 88 to 12 percentage split of older children in the dichotomy. These findings agree with the recommendation.

TABLE 9

MEAN COIN TEST 1 SCORES OF CHILDREN EITHER GIVEN OR NOT GIVEN SPENDING MONEY IN PAST WEEK

	HAD SPENDING MONEY		LACKED SPENDING MONEY			
Age	*N*	*M*	*N*	*M*	*t*	*p*
7–8 years	128	11.8	64	10.4	3.59	.01
11–12 years	169	13.4	23	13.0	1.33	.20

Similar analyses could not be made for experience with money scores because receiving spending money in the past week and describing its use contributed a possible four points to the experience with money score.

3. *It is not the amount of money given to the child, but the way the money is used that determines whether the child will gain knowledge from the experience.*

The aspect of this recommendation that could be tested in this project was the specified lack of relation between amount of money given to the child and knowledge of money and its use. For the 96 11- and 12-year-old girls, the amount of the week's spending money and the amount of gift and earned money received in the past year correlated with both the short and long forms of the coin test of knowledge of money use, as is shown in Table 10. Average *r*s were large enough to be significant for all 384 and 187 children between Coin Tests 1 and 2, respectively, and the two amounts of money. These data are sufficient to indicate the falsity of the assumption of no relation between the amount of money given to the child and knowledge of money use. A parent practice recommendation on these aspects would agree with these data if it said, "As the amount of money given to

TABLE 10

AVERAGE CORRELATIONS BETWEEN AMOUNT OF MONEY RECEIVED BY CHILDREN AND COIN TEST 1 AND 2 SCORES

	Week's Spending Money		Year's Gift and Earned Money	
Sex and Age	*Coin Test 1*	*Coin Test 2*	*Coin Test 1*	*Coin Test 2*
Boys				
7–8 years	.07		.23*	
11–12 years	.15	—.07	.05	.19
Girls				
7–8 years	.07		.18	
11–12 years	.23*	.33**	.15	.39**
All	.14**	.14*	.16**	.29**

* Significant beyond .05 level.
** Significant beyond .01 level.

the children of a specified age increases, there is an increase in the children's knowledge of the use of money."

4. *Children will have more knowledge of money use if their parents give them an allowance.*

Children were classified as receiving an allowance if (a) they stated that they were given the same amount of spending money each week by their parents; (b) the amount to spend in the past week, given as answer to an earlier question in the interview, was the same as the amount they said was their allowance; and (c) they selected statements that most of the time their parents gave them money without being asked to do so and without asking why the child needed money from two sets of alternatives preceding allowance questions. Answers of 110 children from eight counties met these requirements.

Scores on the coin test of money knowledge did not differ for children in the allowance – no allowance dichotomy, as is shown in Table 11. Differences in Coin Test 1 and 2 scores were tested by age groups within allowance dichotomy analyses of variance as well as *t* tests. The lack of a difference is noteworthy since three variables previously demonstrated to be positively correlated with coin test scores had differences favoring allowance children that were significant in analyses of variance and *t* tests. Children given an allowance had higher experience with money scores than children not given an allowance, as is shown in Table 11. Parents of allowance children had an average year more of education and a higher Belcher-Sharp Socioeconomic Score than parents of the other children. These data contradict, rather than support, the recommendation on the value of an allowance.

TABLE 11

ALLOWANCE DICHOTOMY COMPARISON OF MEAN COIN TEST 1 AND EXPERIENCE WITH MONEY SCORES

	Allowance		No Allowance			
Test and Age	*N*	*M*	*N*	*M*	*t*	*p*
Coin Test 1						
7 years	9	11.9	87	10.8	2.50	.02
8 years	26	11.9	70	11.8	.27	...
11 years	24	13.0	72	13.0	.00	...
12 years	20	13.6	76	13.6	.13	...
Experience with Money						
7 years	16	16.9	112	12.4	3.31	.01
8 years	37	18.5	91	14.4	4.32	.01
11 years	29	20.6	99	17.4	2.68	.01
12 years	28	21.6	100	19.4	2.55	.02

5. *If children are given allowances, less of the family's money, rather than more, will be taken for children's spending money.*

In the preceding chapter, data were presented to demonstrate that the amount of money given to children varied so greatly in this sample that no differences between group or variable means could be significant. These data constitute a test of this recommendation and do not support the recommendation. Rather the findings indicate that no generalization on group differences in the mean amount of spending money given to children will apply to a large number of families selected at random to represent a diverse socioeconomic population.

Inspection of the amount of allowance data presented in Table 12 and comparison with the amount of spending money data presented in Table 2 suggest little difference except in standard deviations. The smaller standard

TABLE 12

MEAN AMOUNT OF WEEKLY ALLOWANCE, RANGE, AND STANDARD DEVIATION IN AGE GROUPS

Age	*N*	*M*	*Range*	*SD*
7 years	16	$0.21	$0.05 to 0.50	$0.15
8 years	37	0.41	0.05 to 3.00	0.53
11 years	29	0.57	0.05 to 1.00	0.40
12 years	28	0.69	0.15 to 2.00	0.47

deviations for the allowance distributions and the positively skewed distributions of both the week's spending money and allowances probably indicate that the means for allowance children would necessarily be somewhat less in amount than spending money means.

6. *Children will have more knowledge of money if they save money.*

Children were classified as saving money if they stated that in the past or currently they had saved for a named item at least three times as much money as they had to spend in the past week. By this definition, 69 per cent of the children in the six counties taking the coin test had saved money. The two sexes did not differ in the number of children at each age who saved money by χ^2 tests. The number saving at each age is listed in Figure 2.

Children who saved money had higher scores on the coin test of knowledge of money use, as indicated by Figure 2. The difference favoring "savers" was significant beyond the .001 level in an age groups by saving

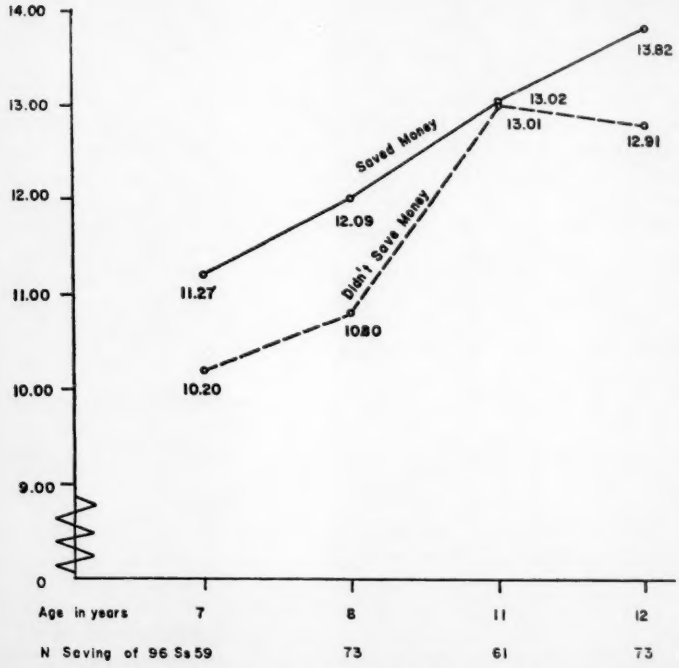

FIGURE 2—Mean Coin Test 1 scores of children who saved or did not save money at the four age levels.

dichotomy analysis of variance and beyond the .01 level by t tests at all ages except 11 years. These data support the recommendation.

Saving money contributed points to the experience with money score. The 4.8 point difference in these scores that favored children who saved money necessarily includes points for saving as well as any other experience difference.

7. *If children are given opportunities to earn money, they will have more knowledge of money use than children lacking this experience.*

Two definitions of earning money were used to discriminate children for tests of this recommendation. One definition was that the child could give the amount of money earned by work at home and elsewhere in the past year. This definition discriminated between children only at the age of 7 years when 72 per cent of the girls and 70 per cent of the boys earned money. At this age, by t test, the children who earned money did not differ from nonearners in Coin Test 1 scores. Earning 7-year-olds, however, had higher experience with money scores ($M = 13.8$) than those not earning money ($M = 11.2$). Since 84 to 97 per cent of all older children had earned money, there were not enough nonearners by this definition to determine differences.

Most children reported working at home. Questions about how they associated money payment with the performance of a task (whether for specific jobs, or for off and on assistance "When they wanted to," etc.) were not included in the interview. There were a few children in each age and sex group who said they had no money other than earned money to spend or who reported specified payment for specific tasks performed over a period of time, the other definition used to discriminate between children. There were 11 and 15 of these earning children in the 11- and 12-year-old groups of boys, respectively. These boys differed from other boys of the same age only by having earned about three times as much money. The authors do not know how a comparable group of girls could be selected from the information available.

The findings do not support the recommendation since differences in knowledge of money use were not associated with payment for work for either younger or older children and when two definitions were used to determine the dichotomy of earners and nonearners.

8. *Children will have less knowledge of money use if money is used to reward or punish their behavior.*

Money had not been used to reward or punish the behavior of 238 children, according to statements of parents. There were no differences between Coin Test 1 scores or experience with money scores of these children and of the 231 children sometimes or often rewarded with money or the 75 children sometimes or often punished with money in age groups by parent behavior analyses of variance. Mean scores also did not differ between re-

warded children and punished children. Mean Coin Test 1 scores were 12.1 (reward), 12.5 (neither), and 12.5 (punish), while mean experience with money scores were 16.1 (punish), 16.3 (neither), and 16.5 (reward). These data provide no support for this recommendation.

9. *Children learn through spending money foolishly, and, as they grow older in years and experience, will spend money more wisely.*

The aspect of this recommendation that could be tested in this project was that suggesting a marked change with age in the use of spending money. Six years of age were covered by the younger and older ages of this project. The percentages of children receiving spending money who purchased specific types of items at the sample ages are presented in Table 13.

TABLE 13

PERCENTAGES OF CHILDREN IN AGE AND SEX GROUPS WITH SPENDING MONEY IN PAST WEEK WHO PURCHASED VARIOUS TYPES OF ITEMS

Age, N, and Sex	Purchased Food Snacks: *Only*	*+ Others**	*Total*	Purchased Only Items Relating to: *School*	*Clothing*	*Gifts*	*Others**
7–8 Years							
81 boys	46	14	59	6	1	4	30
93 girls	53	19	72	8	5	4	11
11–12 Years							
114 boys	25	45	70	7	1	4	18
111 girls	27	41	68	6	6	3	17

* "Others" indicates money was used for either an item not listed, such as toys and games, payment of dues, saving, giving to church, tickets for games and movies, etc., or for a combination of items exclusive of food snacks.

Inspection of these data suggests a marked lack of difference associated with age in most single item categories. By χ^2 tests there were no age or sex differences in the total percentages of children spending some or all of their money for food snacks (candy, gum, soft drinks, fruit, milk, potato chips, etc.). In this sample 68 per cent of all children given spending money spent part or all of this money on food snacks, while in the Mississippi sample (4, p. 8) 87 per cent of the 7- and 8-year-olds and 93 per cent of the 11- and 12-year-olds used spending money to purchase food snacks. As is shown in the first two columns of Table 13, the percentage of Kentucky children using their money only for food snacks decreased with age while the percentage using their money to purchase other items as well as food snacks increased with age. This difference was significant by χ^2 test and is similar to findings of the Mississippi survey. This change was accompanied by an increase in spending money, listed earlier in Table 2, and may not relate to the use of a constant amount of money. The findings do

not support the aspect of the recommendation that suggests there is a marked change with age in the use of spending money.

10. *Children will have the attitudes about the importance of money and material things that are expressed by their parents.*

Fathers and mothers were dichotomized as money-centered and nonmoney-centered on the parent attitude test. Children were dichotomized as materialistic and nonmaterialistic on the child attitudes test. None of the χ^2 tests of independence was significant for the fathers' and mothers' dichotomies separately and combined when tested with the children's age and sex group attitude dichotomies separately and combined. The recommendation was not supported by these data.

The lack of relation between child and parent attitudes was reported also for the mothers' dichotomy and for nonmoney-centered fathers in the Mississippi survey (4, p. 27). In Mississippi, however, there were more materialistic children than nonmaterialistic children when fathers expressed money-centered attitudes. As has been described elsewhere in this report, more fathers were money-centered than mothers in the Mississippi sample, and this difference was not found in the Kentucky parent sample.

11. *Children will have more knowledge of and experience with money if their parents' attitudes are money-centered.*

This recommendation was tested by product-moment correlations in each age and sex group between point scores for fathers' and mothers' money-centered attitudes and the five children's knowledge and use of money scores. The only *r*s large enough to be significant were those between mothers' money-centered attitudes and children's scores on the coin tests of knowledge of money use (average $r = .21$). Since high point scores for the mothers indicated less money-centered attitudes, these *r*s suggest a negative relation between the degree to which the mother's attitudes are money-centered and the child's knowledge of money use. In an age groups by mothers' attitude analysis of variance the difference for coin test scores was in the same direction and significant beyond the .001 level.

No differences in coin test scores and experience with money scores were found for the fathers' attitude dichotomy in analyses of variance. Additionally, the child's experience with money score did not differ with mother's attitude in these statistical tests.

None of the data furnishes support for the recommendation, and the only relation found contradicts the recommendation. For all ages and both sexes of these children, as mothers expressed less money-centered attitudes, children's scores were higher on the test of knowledge of money use.

12. *Children will have more knowledge of and experience with money if their parents handle the family income wisely (follow practices recommended by money management specialists).*

This recommendation was tested by correlating the parent recommended practices scores with the five children's knowledge and use of money scores at each age and sex level. The list of average *r*s in Table 14 suggests that age and sex of child limit the generality of this recommendation. While for girls coin test scores did not correlate with parent recommended practices scores, the average *r* (.18) for Coin Test 1 scores of all ages of boys is large enough to be significant. Correlations of parent scores with experience with money scores were positive and about the same size (.26) for boys of all ages except 12 years ($r = -.23$). For girls positive *r*s of this size occurred only at the ages of 11 and 12 years. The correlations between parent recommended practices scores and boys' year's gift and earned money were not significant. For girls these correlations were significant when all age *r*s were averaged ($r = .21$), and for the ages of 11 and 12 years, as shown in Table 14.

Since only the week's spending money of children failed to correlate at some age and sex level with the parent recommended practices scores, these data furnish evidence of support of the recommendation. The degree to which parents followed recommended money practices was associated at some age and sex levels with measures of children's knowledge of money, children's experience with money, and the amount of money earned or given to the children in the past year.

TABLE 14

AVERAGE CORRELATIONS BETWEEN PARENT RECOMMENDED PRACTICES SCORES AND CHILDREN'S KNOWLEDGE AND USE OF MONEY SCORES IN AGE AND SEX GROUPS

	BOYS		GIRLS	
Test	*7–8*	*11–12*	*7–8*	*11–12*
Coin Test 1	.19	.17	—.05	.03
Coin Test 2		.16		—.05
Experience with Money	.26**	.02	.01	.26**
Spending Money	—.13	.05	.14	.02
Earned and Gift Money	.02	.16	.15	.28*

* Significant beyond .05 level.
** Significant beyond .01 level.

DISCUSSION

Perhaps the most unusual contribution of this project to knowledge of relations between parent and child behavior is the association found between specific parent practices and specific aspects of children's behavior. Parent-child behavior investigations of the past decade have tended either not to find evidence of relations (e.g., 3, 11) or to find relations suggested

only between a few general characteristics of parent and child (e.g., 17, 19, 22). There has been little evidence heretofore that recipes of specific practices for parents could relate to children's behavior.

The specificity of the findings does not mean that they are not parts of general statements of relations. Several of the specific parent practices supported by the findings are aspects of the generalization that knowledge is acquired only when there is an opportunity to learn the knowledge. Opportunity for children to learn the use of money is provided in four parent practices supported by the evidence of this project: (a) to give children wide experience in the use of money, (b) to give children money to spend, (c) to increase the amount of money given to children, and (d) to give children the opportunity to save money.

Opportunities to learn the use of money, of course, were influenced by factors other than parental practices. The number of children's learning experiences, indicated by the experience with money score, decreased as the number of brothers and sisters increased, varied with unknown factors distinguishing counties, increased when the mother was employed away from home, and decreased for 7- and 8-year-olds when they resided on farms rather than in towns. However, these factors or differences in opportunities to learn did not relate to scores on the coin test of knowledge of money use, while evidence of relations was found between the parent practices and the coin test scores.

Another group of findings suggests that the example set by parental money behavior may be too remote from the child's abilities and possible experiences to influence the money behavior of 7- to 12-year-old children. The majority of the children were materialistic in attitude at the ages of 7 and 8 years and nonmaterialistic in attitude at the ages of 11 and 12 years, regardless of the degree of money-centeredness of parental attitudes. The more money-centered parents had the children with less knowledge of and experience with money. It was found that children had more knowledge of and experience with money when parents followed more of the recommended money management practices. This finding is more easily accounted for by interpretations other than that of the example set, however. The management of family income is very dissimilar to the children's use of money detailed in Table 13. The parent recommended practices score had a high enough correlation (.53) with socioeconomic status to suggest that larger family incomes may have made it easier for high score parents to give children both money and other learning experiences. Additionally, the scoring of recommended practices gave more points for the practices that provided children with more experiences in money use.

All specific parent practices tested in this project were recommendations included in publications planned for mass distribution to parents. Obviously, the advocates of these practices could not have made these recommendations if they had accepted as fact one generalization that has described earlier research findings, "There are no recipes in child guidance." The

findings of this project disagree with that generalization and do not disagree with the viewpoint that research knowledge is too tentative to permit acceptance of such generalizations as fact. This, however, is no justification for the mass distribution of these recommendations to parents for more than 25 years (7, 16) or for the lack of earlier research on relations of these recommendations to child behavior.

The findings of this project suggest that the practice of giving an allowance does not deserve its present prominence in recommendations for money education. Since differences in children's knowledge of money use were shown to be associated with four specific parent practices, any differences in knowledge associated with receiving an allowance should have been found also, and such differences did not occur. The 110 children given allowances in this investigation had higher experience with money scores than other children and were children of parents who averaged a year more of education and a higher socioeconomic status than other parents. Because the three latter factors were positively correlated with knowledge of money use scores, the inference might be made that allowances may interfere with these relations or that allowances may restrict children's knowledge of the use of money. The contradiction between these data and the prominence of the recommendation suggests a need of further research on the value of allowances. The investigators are currently conducting one such study in which children given allowances are matched with others in age, sex, IQ, socioeconomic status, number of siblings, and schools attended.

The data of this project failed to disclose values for the parent practice of encouraging children to earn money, also given prominence in recommendations for money education. This failure may be due in part to the fact that most of the very few children who had not earned money in the past year were found at the youngest age level, 7 years. However, older boys in a dichotomy based on a stringent definition of earning did not differ in scores on either the knowledge or experience tests. This evidence is in line with reports by Harris, Clark, Rose, and Valasek (10) and Prevey (18) that home responsibilities (including earning money) were not associated with general attitudes of responsibility and self reliance.

The use of money to reward or punish children's behavior is frowned upon in almost all treatises concerned with money education. Direct tests of this recommendation in this investigation provided no evidence that these specific practices relate to children's knowledge of or experience with money. Neither was there any suggestion that relations might have been hidden by the investigative procedures used.

The relations found in the tests of recommendations for the estimates of children's knowledge of and experience with money justify the conclusion that these measures were useful. As has been described, these estimates were developed in this investigation and used to test recommendations after analyses indicated the scores had the relations with other variables usually found for measures of educational achievement and experience.

Summary

This investigation had two purposes: one, to explore the assumption that specific parent money education practices affect children's knowledge and use of money, and, two, to demonstrate usefulness for the scores on tests and scales developed to estimate child and parent money behavior.

Subjects were 512 children and 484 different mothers and fathers, selected in part at random and in part to represent rural families in the Blue Grass area of Kentucky. There were 64 boys and 64 girls at each of the ages of 7, 8, 11, and 12 years. The entire ranges of parent education and of family socioeconomic status were well represented in the sample, although 68 per cent of the families lived on farms. Children were given tests and interviews individually at school; parents were interviewed at home.

The variables usually relating to measures of educational status, age, IQ, parent education, and socioeconomic status, had positive linear relations with children's scores on the coin tests of knowledge of money use and the experience with money scale, with the amount of money given to children, and with parents' scores on the parent recommended practices scale. It was concluded that these measures, developed in this project, had the usefulness required to test aspects of typical recommendations for parents.

Four recommendations for parent money education practices were supported by the data. They were as follows:

1. If children are given wide experience in the use of money, they will have more knowledge of money and its use than children lacking such varied experiences.

2. Children will have more knowledge of money use if they are given money to spend.

3. Children will have more knowledge of the use of money if they save money.

4. Children will have more knowledge of and experience with money if their parents handle the family income wisely (follow practices recommended by money management specialists).

The findings did not support five other recommended parent money education practices that follow:

1. Children will have more knowledge of money use if their parents give them an allowance.

2. If children are given allowances, less of the family's money, rather than more, will be taken for children's spending money.

3. If children are given opportunities to earn money, they will have more knowledge of money use than children lacking this experience.

4. Children will have less knowledge of money use if money is used to reward or punish their behavior.

5. Children will have the attitudes about the importance of money and material things that are expressed by their parents.

The evidence suggested that three other recommended parent money education practices be changed, as follows:

1. *From:* It is not the amount of money given to the child, but the way the money is used that determines whether the child will gain knowledge from the experience. *To:* As the amount of money given to children of a specified age increases, there is an increase in the children's knowledge of the use of money.

2. *From:* Children learn through spending money foolishly, and, as they grow older in years and experience, will spend money more wisely. *To:* There is no marked change with age in children's use of spending money. However, as they are given more spending money or as age increases from 7 to 12 years, the number spending money only for food snacks decreases, while the number purchasing other items as well as food snacks increases.

3. *From:* Children will have more knowledge of and experience with money if their parents' attitudes are money-centered. *To:* If parent attitudes are not centered around money, children will have more knowledge of the use of money.

The evidence supports the assumption that specific money education practices of parents affect children's knowledge and use of money, even though several of the most widely advocated practices were not associated with differences in children's money behavior.

References

1. Belcher, J. C., & Sharp, E. F. A short scale for measuring farm family level of living: a modification of Sewell's Socio-Economic Scale. *Okla. Agric. Exp. Station Tech. Bull.*, 1952, No. T-46.

2. Briggs, Margueritte, & Sullivan, Catherine M. Your child and his money. *Univer. Ill., Coll. Agric., Extension Serv. Agric. and Home Econ. Circular*, 1955, No. 741.

3. Burchinal, L. G., Hawkes, G. R., & Gardner, B. The relationship between parental acceptance and adjustment of children. *Child Develpm.*, 1957, 28, 65-77.

4. Dickins, Dorothy, & Ferguson, Virginia. Practices and attitudes of rural white children and parents concerning money. *Miss. Agric. Exp. Station Tech. Bull.*, 1957, No. 43.

5. Dunsing, Marilyn. Spending money of adolescents. *J. Home Econ.*, 1956, 48, 405-408.

6. Gross, Irma H., & Crandall, Elizabeth W. *Management for modern families.* New York: Appleton-Century-Crofts, 1954.

7. Gruenberg, Sidonie M., & Gruenberg, B. C. *Parents, children, and money.* New York: Viking Press, 1933.

8. GRUENBERG, SIDONIE M., & KRECH, HILDA S. *Pennies in their pockets: helping children manage money.* Chicago: Science Research Associates, 1955.

9. HANSON, ROSE L. A study of children's use of money. *Univer. Ia. Stud. Child Welf.,* 1934, 8, 221-247.

10. HARRIS, D. B., CLARK, K. E., ROSE, ARNOLD M., & VALASEK, FRANCES. The relationship of children's home duties to an attitude of responsibility. *Child Develpm.,* 1954, 25, 29-33.

11. HIGHBERGER, RUTH. The relationship between maternal behavior and the child's early adjustment to nursery school. *Child Develpm.,* 1955, 26, 49-61.

12. HOFFER, JOSEPHINE W. Children's experiences with money. Unpublished master's thesis, Oklahoma A. & M. Coll., 1947.

13. HURLOCK, ELIZABETH B. *Child development.* New York: McGraw-Hill, 1956.

14. KING, MARTHA B. *Money management: children's spending.* Chicago: Household Finance Corp., 1953.

15. LINDQUIST, E. F. *Design and analysis of experiments.* Boston: Houghton Mifflin, 1953.

16. OJEMANN, R. H. What money means to the child. *Univer. Ia. Child Welf. Pamphlets,* 1933, No. 25.

17. PECK, R. F. Family patterns correlated with adolescent personality structure. *J. abnorm. soc. Psychol.,* 1958, 57, 347-350.

18. PREVEY, ESTHER E. A quantitative study of family practices in training children in the use of money. *J. educ. Psychol.,* 1945, 36, 411-428.

19. SONTAG, L. W., BAKER, C. T., & NELSON, VIRGINIA L. Mental growth and personality development: a longitudinal study. *Monogr. Soc. Res. Child Develpm.,* 1958, 23, No. 2.

20. STONE, L. J., & CHURCH, J. *Childhood and adolescence.* New York: Random House, 1957.

21. TROELSTRUP, A. W. *Consumer problems and personal finance.* (2nd ed.) New York: McGraw-Hill, 1957.

22. WITTENBORN, J. R., *et al.* A study of adoptive children. *Psychol. Monogr.,* 1956, 70, Nos. 1, 2 and 3.

PSYCHOLOGICAL HEALTH AND COGNITIVE FUNCTIONING IN ADOLESCENCE: A MULTIVARIATE ANALYSIS[1]

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Naive conceptions regarding the relationship between psychological health and cognitive functioning pervade both the professional literature and the popular press. Most crudely stated, these conceptions imply that as psychological health goes, so goes cognition; that disorders and malfunctioning of the former will be accompanied invariably by disorders and malfunctioning of the latter. On the basis of such beliefs educators and other professional workers have been led to assume that any practice designed to promote a person's psychological well-being will produce direct and substantial gains in the cognitive acuity of that person.

When one seeks evidence to support this general conception, the results are disappointing. Both clinical and empirical investigations concerned with the interplay between psychological health and cognition attest to the complexity of this relationship. Rapaport (8), for example, describes the dynamics by which intellectualization, or the libidinization of thought-processes, comes to be used as a potent defense mechanism for the individual. More recently, Haggard and others (5) have identified particular personality constellations in children, some involving pathology, that are associated with outstanding achievement in certain scholastic areas. In an earlier paper the present authors described the differences in scholastic achievement which accompany public-private conflicts within the individual (7). From these and other investigations it is apparent that differences in the definitions both of psychological health and of cognitive functioning produce corresponding differences in the conclusions which may be drawn concerning the relationship between the two. The need to specify the conditions which affect this relationship is evident.

PROBLEM

The research described here analyzes the effect of four major classes of variables upon the relationship between pyschological health criteria and cognitive performance. These variables include: (a) five measures of psycho-

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logical health, (b) eight types of cognitive performance, (c) six school grade levels, and (d) sex. It is the purpose of this research to study the contribution each of these variables makes to observed variablity in the psychological health-cognition relationship. In addition, the interaction among these classes of variables is examined.

Subjects, Instruments, and Procedures

The subjects of this research were 292 boys and 241 girls enrolled in a Midwestern private school. These students were divided into six class groups ranging from the sixth grade to the senior year of high school. In this institution a single grade, the "pre-freshman," is substituted for the usual seventh and eighth grade levels so that the high school group is one year advanced when compared with most public school adolescents. All subjects were given the following tests of cognitive ability:

1. *Individual intelligence tests.* In most cases, this was the WISC. A small number of children were given the Henmon-Nelson, the scores of which were converted by regression equation into equivalent WISC scores.

2. *Standardized numerical achievement test.* Due to differences in the curricula of various grade groups it was not possible to administer the same test of numerical achievement to all subjects. The following tests were given according to grade placement:

Sixth Grade—Iowa Everypupil Arithmetic Test, Advanced Form O
Pre-Freshmen—Snader General Mathematics Test
Freshmen—Cooperative Elementary Algebra Test, Form T
Sophomores—Cooperative Intermediate Algebra Test
Juniors—Cooperative Geometry Test, Form 2
Seniors—Cooperative Geometry Test, Form 2

3. *Standardized verbal achievement test.* The Cooperative Reading Test was given to all students from the sixth grade through the junior year of high school. Sixth graders and pre-freshmen were given Test C1, Form Y; the remaining three groups received Test C2, Form T of the Cooperative Reading Instrument. The verbal achievement of seniors was assessed by means of the USAFI GED Test 1.

4. Five "creativity" measures adapted from the test batteries of Guilford (4) and Cattell (2), or designed especially for this study, as follows:

a. *Word Association.* The subject was asked to give as many definitions as possible to fairly common stimulus-words, e.g., "bolt," "bark," "sack." His score depended upon the absolute number of definitions and the number of different categories into which these definitions could be put.

b. *Uses for Things.* The subject was required to give as many uses as he could for objects that customarily have a stereotyped function attached to them, e.g., "brick," "paper clip." His score depended upon both the number and originality of the uses which he mentioned.

c. *Hidden Shapes.* The subject was required to find a given geometric form that was hidden in more complex geometric forms or patterns.

d. *Fables.* The subject was presented with four fables in which the last lines were missing. He was required to compose three different end-

ings for *each* fable: a moralistic, a humorous, and a sad ending. His score depended upon the number, appropriateness, and originality of the endings.

e. *Make Up Problems.* The subject was presented with four complex paragraphs each of which contained a number of numerical statements, e.g., "the costs involved in building a house." He was required to make up as many mathematical problems as he could that might be solved with the information given. His score depended upon the number, appropriateness, and originality of the problems.

The following psychological health instruments were administered to all subjects:

1. *Group Rorschach.* Cards III, IV, IX, and X were projected on a screen. For each picture the subject was presented with 10 responses and was asked to choose the three which he thought to be most appropriate. Each list of 10 contained four "pathological" responses. The subject's score was the number of nonpathological responses among his 12 choices (6).

2. *Direct Sentence Completion.* The subject was asked to complete 27 sentences of the type: "When I saw I was going to fail I _____," or, "I think my father is _____." Each sentence was given a plus or minus score depending upon the presence of absence of morbid fantasy, defeatism, overt aggression, and the like. The total score was the summation of the individual sentence scores.

3. *Indirect Sentence Completion.* This instrument was identical with the Direct Sentence Completion except that proper names were inserted for the pronoun "I," thus changing it from a "self-report" to a "projective" instrument. Boys' names were used in the male form of the instrument and girls' names in the female form. The instrument was presented as a "thinking speed" test. To reinforce this notion subjects were asked to raise their hands when they were finished and the elapsed time was written on the front of their test booklet. This instrument was administered approximately two weeks *prior* to the administration of the Direct Sentence Completion.

4. *California Personality Test.* Two forms of this instrument were used. The intermediate form was given to sixth graders and pre-freshmen; the secondary form was given to all of the older groups. Two subscores were obtained, one in "personal adjustment" and one in "social adjustment."

Correlation coefficients were computed for all cognitive-psychological health combinations.[2] The data were treated separately by sex and by school grade so that at each of the six grade levels 80 coefficients were produced, 40 for each sex. In order to test for the effects of sex, school-grade, and sex-grade interactions upon the variability of the correlations, the coefficients were transformed into Fisher z scores and standard chi square statistics were computed. It was not possible to follow the same procedure in the analysis of main effects for the psychological health and cognitive variables since the assumption of independence of observations (correlation coefficients) could not be met. In this latter section of the analysis tests of statistical significance were limited to selected combinations of variables.

[2] Coefficients describing the relationship *among* the two sets of tests were also computed, but are not treated in this paper.

TABLE 1

CORRELATIONS BETWEEN PSYCHOLOGICAL HEALTH VARIABLES AND COGNITIVE PERFORMANCE FOR BOYS*

Grade	N	Fables	Uses	Hidden Shapes	Word Association	Make Up Problems	Verbal Achievement	Numerical Achievement	IQ
Group Rorschach									
6th Grade	46	016	168	206	303	249	224	260	573
Pre-Freshmen	55	046	—036	—157	—047	145	086	085	—108
Freshmen	77	—100	084	187	045	—014	—196	109	—100
Sophomores	46	—024	—285	044	—068	075	058	—010	042
Juniors	45	046	—241	170	114	101	—010	054	188
Seniors	21	126	—564	—247	—225	—023	—170	—030	—030
Direct Sentence Completion									
6th Grade	46	—009	106	—144	049	—029	170	105	138
Pre-Freshmen	55	—068	336	077	121	445	072	269	020
Freshmen	77	—100	044	—065	003	107	034	164	026
Sophomores	46	038	—143	—019	—003	018	—355	—049	—054
Juniors	45	076	—317	—055	—069	052	—461	069	—027
Seniors	21	—201	353	137	—086	116	—246	018	255
Indirect Sentence Completion									
6th Grade	46	145	—155	—120	141	—079	070	—095	012
Pre-Freshmen	55	—086	151	—036	146	016	111	135	—028
Freshmen	77	—283	—158	—008	033	—076	—087	076	—254
Sophomores	46	—048	—121	005	—046	000	—224	017	—122
Juniors	45	029	—200	—165	—060	—057	—389	—012	—016
Seniors	21	—320	121	211	—202	—024	—019	—141	204
California Personal Adjustment									
6th Grade	46	004	—017	114	304	166	414	291	—076
Pre-Freshmen	55	—016	201	077	121	094	023	187	183
Freshmen	77	093	078	205	086	112	041	078	120
Sophomores	46	035	—017	—217	018	—077	—062	—028	070
Juniors	45	201	—021	—007	—107	—095	—247	—178	—015
Seniors	21	080	237	265	—084	269	061	132	180
California Social Adjustment									
6th Grade	46	117	—025	069	237	320	435	223	—029
Pre-Freshmen	55	028	191	096	260	205	201	254	263
Freshmen	77	—075	—066	124	061	091	140	202	066
Sophomores	46	—060	—151	—215	—025	099	—159	—121	—050
Juniors	45	297	—047	087	043	014	—179	—015	—047
Seniors	21	—037	249	097	—293	254	—075	106	053

* For purposes of presentation, decimals have been omitted.

TABLE 2

CORRELATIONS BETWEEN PSYCHOLOGICAL HEALTH VARIABLES AND COGNITIVE PERFORMANCE FOR GIRLS*

Grade	N	Fables	Uses	Hidden Shapes	Word Association	Make-Up Problems	Verbal Achievement	Numerical Achievement	IQ
Group Rorschach									
6th Grade	32	205	143	407	461	215	396	118	105
Pre-Freshmen	41	—248	—125	497	—059	330	—021	166	264
Freshmen	65	048	253	203	357	193	204	230	171
Sophomores	43	—182	—159	—075	209	269	441	348	432
Juniors	43	173	235	168	309	192	391	347	551
Seniors	17	188	—043	104	166	449	330	322	373
Direct Sentence Completion									
6th Grade	32	—172	—019	040	—101	036	—291	287	—147
Pre-Freshmen	41	—232	—255	139	—148	—150	—176	—238	—153
Freshmen	65	—056	—032	—189	—194	—121	—028	182	076
Sophomores	43	—170	245	—368	—107	—287	—091	—295	—043
Juniors	43	064	067	029	063	—013	041	319	175
Seniors	17	163	—140	—062	267	071	059	—184	002
Indirect Sentence Completion									
6th Grade	32	—269	—029	—302	—461	—172	—492	270	—380
Pre-Freshmen	41	—145	087	190	154	003	—012	—086	123
Freshmen	65	—136	—013	—073	—207	—269	—256	—110	—176
Sophomores	43	—221	—250	—126	—029	—038	057	—067	073
Juniors	43	213	082	281	—131	177	070	296	144
Seniors	17	044	—354	—434	—062	—345	035	—065	—520
California Personal Adjustment									
6th Grade	32	—061	299	—022	—120	008	—221	332	—138
Pre-Freshmen	41	003	—171	070	—191	—182	128	—033	—018
Freshmen	65	—010	—114	—037	—104	—128	073	—146	—007
Sophomores	43	006	—174	—157	—171	—205	—162	—141	—134
Juniors	43	141	191	—345	138	—141	098	218	047
Seniors	17	511	203	—186	193	009	115	—124	107
California Social Adjustment									
6th Grade	32	—011	030	—080	022	064	—107	395	—059
Pre-Freshmen	41	032	—207	073	—114	—015	236	053	185
Freshmen	65	—001	—146	—088	—031	—022	109	—009	—011
Sophomores	43	043	—172	—091	—232	—081	—187	—074	037
Juniors	43	169	218	—325	171	—147	188	142	092
Seniors	17	151	—065	—361	—152	—432	—268	—513	—456

* For purposes of presentation, decimals have been omitted.

Results

Considering the total population of correlation coefficients, the relationship between psychological health and cognition appears to be rather weak, although quite variable. These coefficients are shown in Tables 1 and 2. The mean of the correlations was .04, and the range was from −.56 to +.56. As the following analysis will show, however, it is incorrect to subscribe to the generalization that little or no relationship exists between psychological health criteria and cognitive functioning. When the effects of the four major variables are examined, the relationship is seen to alter in a systematic fashion.

Chi square statistics computed to test sex, grade, and sex-grade interaction effects among the correlation coefficients are given in Table 3. As this table indicates, the relationship between psychological health and cognition, as measured by specific criterion variables, reflects both sex and grade differences. Only two of the instruments used in the study fail to show significant variability with sex, grade, or sex-grade interaction. These two variables are the California Personal Adjustment score and the Fables Test. It is also important to note that the effects of sex and grade are far from uniform throughout the table. Thus, depending on the particular pair of variables chosen, one could find support for almost any hypothesis dealing with the effect of sex and grade variables.

The single psychological health variable that seems most sensitive to sex and grade variability is the Group Rorschach. Nine of the 18 significant chi squares in Table 3 involve this variable. A more precise description of this variability will be given below.

The correlation coefficients which show significant variability with grade are presented graphically in Figures 1 and 2. The sexes are presented separately since some of the grade differences are also combined with differences between boys and girls.

The following observations concerning these two graphs seem appropriate:

1. For boys there is a general decline in the relationship with age. The sixth grade period is the one during which the relationship between psychological health and the quality of cognitive performance appears to be highest. In addition, there is a tendency for the variability among these correlations to become greater as one moves from the lower to the higher grades.

2. Among senior boys there is a pronounced negative relationship between the Group Rorschach and three tests of creativity.

3. The correlation coefficients for girls are much more cyclic in their variability. They are highest, on the average, and much less variable in the junior year of high school.

4. Unlike senior boys, the senior girls show pronounced negative correlations between performance on academic tests and psychological health measures involving self-report or personal appraisal.

TABLE 3

CHI SQUARE STATISTICS COMPUTED TO TEST SEX, GRADE, AND SEX-GRADE INTERACTION EFFECTS AMONG CORRELATION COEFFICIENTS

		Psychological Health Variable				
Cognitive Variable	*Sex-Grade Variable*	*Group Rorschach*	*Direct Sentence Completion*	*Indirect Sentence Completion*	*California Personal Adjustment*	*California Social Adjustment*
Fables	Sex	—	—	—	—	—
	Grade	—	—	—	—	—
	Sex-Grade	—	—	—	—	—
Uses	Sex	4.52*	—	—	—	—
	Grade	12.96*	—	—	—	—
	Sex-Grade	—	16.75***	—	—	—
Hidden Shapes	Sex	3.98*	—	—	—	3.84*
	Grade	11.30*	—	—	—	—
	Sex-Grade	—	—	—	—	—
Word Association	Sex	5.49**	—	—	—	—
	Grade	19.27***	—	—	—	—
	Sex-Grade	—	—	—	—	—
Make Up Problems	Sex	—	5.19*	—	—	7.82***
	Grade	—	—	—	—	—
	Sex-Grade	—	—	—	—	—
Verbal Achievement	Sex	9.31***	—	—	—	—
	Grade	—	—	—	—	11.71*
	Sex-Grade	—	11.77*	13.94**	—	—
Numerical Achievement	Sex	—	—	—	—	—
	Grade	—	11.75*	—	—	11.93*
	Sex-Grade	—	—	—	—	—
IQ	Sex	5.34*	—	—	—	—
	Grade	—	—	—	—	—
	Sex-Grade	14.19**	—	—	—	—

NOTE.—All correlations were transformed to Fisher z scores before chi squares were computed. Chi squares with a probability level less than .95 are not shown in this table.

* Significant at the .05 level.

** Significant at the .02 level.

*** Significant at the .01 level.

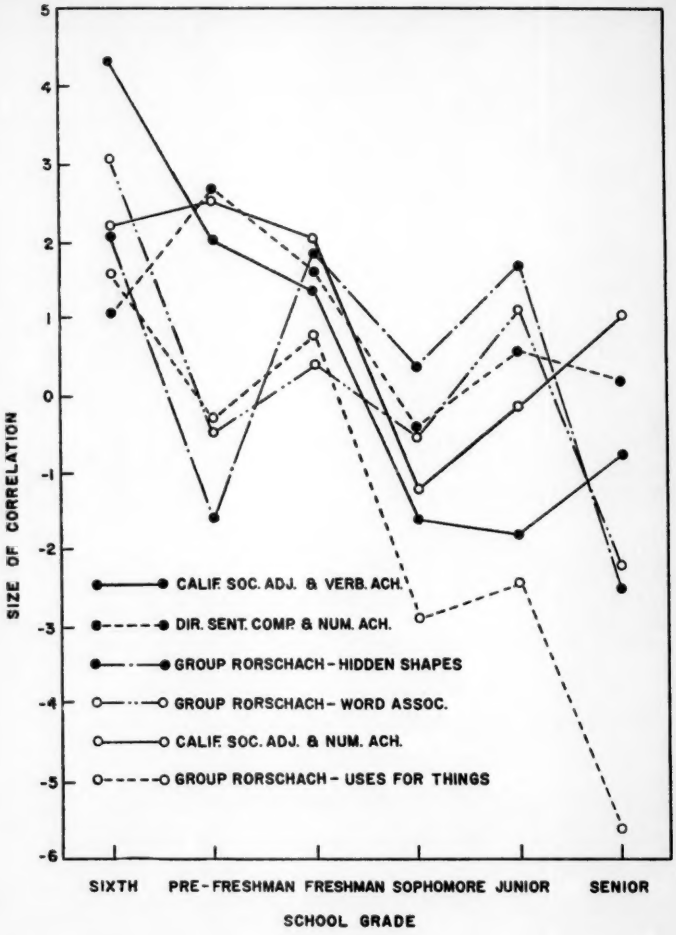

FIGURE 1—Plots of correlation coefficients showing significant changes at various grade levels—boys.

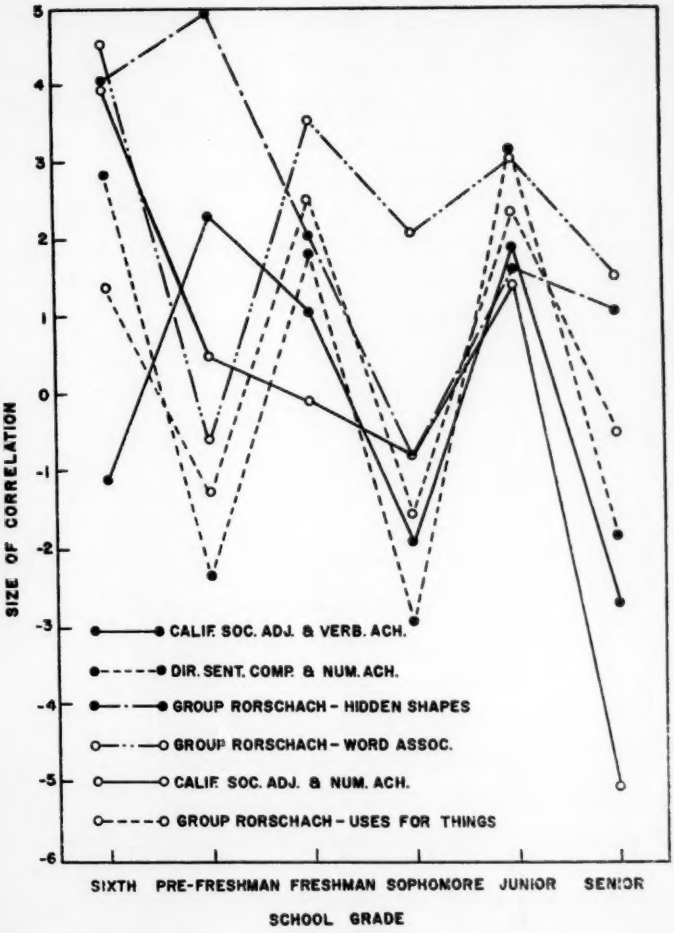

FIGURE 2—Plots of correlation coefficients showing significant changes at various grade levels—girls.

When school grade differences are removed by a procedure of averaging, the correlation coefficients yield the general patterns shown in Figures 3 and 4.

The major findings shown in Figures 3 and 4 may be summarized as follows:

1. The meaning of the sex differences associated with the Group Rorschach (shown in Table 3) becomes dramatically apparent in these two graphs. This instrument shows a striking relationship to cognitive functioning among girls, but not among boys. In fact, no other psychological

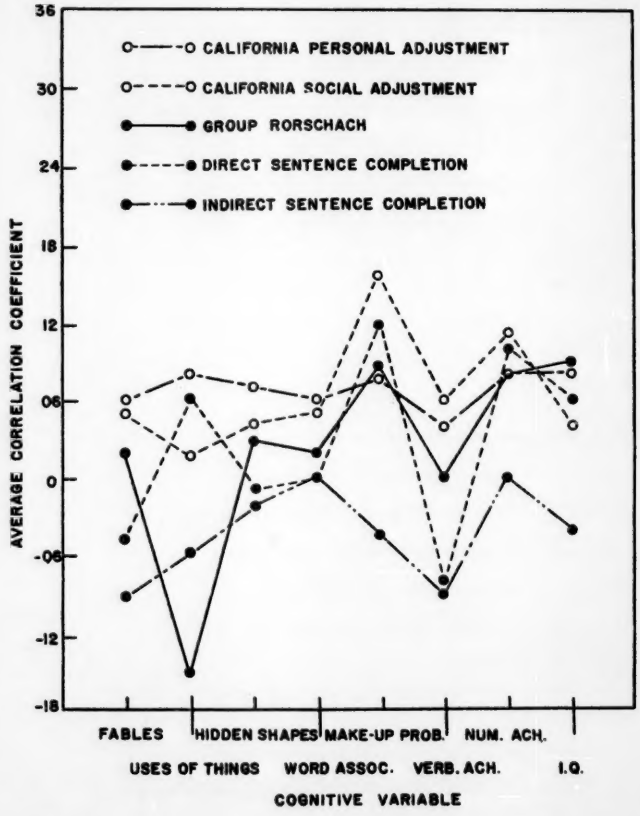

FIGURE 3—Average correlations between psychological health variables and cognitive variables—boys.

health variable in either figure approaches the degree of relationship between pathological fantasy, as measured by the Group Rorschach, and cognitive functioning. Further, the coefficients relating the Group Rorschach to cognitive variables increase noticeably as one moves from creativity tests to measures of scholastic achievement and IQ.

2. For both groups the type of cognitive functioning which on the average shows the greatest sensitivity to psychological health is that which involves the manipulation of numerical symbols. This tendency is somewhat more pronounced in the boys' data.

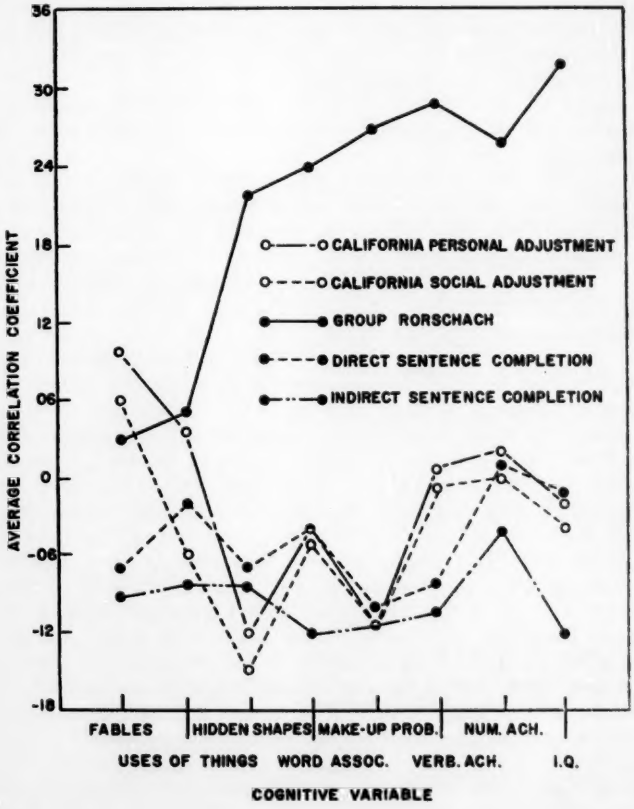

FIGURE 4—Average correlations between psychological health variables and cognitive variables—girls.

3. For girls the great majority of the relationships are negative (with the obvious exception of the Group Rorschach); while for boys the majority of the coefficients are positive.

Discussion

The extreme range and average size of the correlation coefficients treated in this investigation point to the dangers inherent in making broad and sweeping statements concerning the relationship between psychological health and cognitive functioning in adolescence. These data make clear the necessity of qualifying such statements. More specifically, they demonstrate that sex, school grade, the type of psychological health criterion, and the type of cognitive functioning are among the variables that must be considered when making these qualifications.

Among all of the findings described above, those which concern sex differences and the role of pathological fantasy seem to us most worthy of special comment.

Succinctly stated, the above data suggest that the cognitive functioning of girls is more sensitive to aberrations of fantasy than is the cognitive functioning of boys. Also, it should be mentioned that no differences exist among boys and girls in the relative frequency of pathologic responses.[3] Thus, although girls are as likely to choose pathological responses as are boys, this choice gives more information about the cognitive performance of the former than of the latter group.

A tentative explanation of this sex difference might focus on the nature of the responses to the Group Rorschach and the relationship of these responses to differences in cultural expectations for boys and girls.

Among the 16 choices which were considered to reflect pathology on the Rorschach, a great number appear to involve *morbidly aggressive* fantasy, e.g., "bloody stomach," "a burnt mass," "blood and dirt," "an explosion," "a dirty nasty mess," "bloody clouds," etc. Both common observation and recent studies support the notion that society tends to condone, if not encourage, the aggressive actions of boys, while discouraging, if not condemning, similar action on the part of girls. Given these social sanctions aimed at overt behavior, it is not far-fetched to hypothesize correlative self-imposed prohibitions referring to the inner world of the person. Although both sexes may think an equal number of "bad thoughts," the threat to the individual's concept of self-worth instigated by these thoughts may be far from equal for boys and girls. If morbid and aggressive fantasies tend to be less threatening to boys, their occurrence would be less likely to set off a chain of introspective events interfering with rational cognitive functioning. Girls, on the other hand, might be less capable of ignoring this

[3] The mean Rorschach scores for the sexes at each grade level show no statistically significant differences. In five of the six grades girls choose slightly fewer pathological responses than do boys.

"internal disorder," and accordingly there would be greater interference with rational cognitive functioning.

The relationship shown in this research between pathological fantasy and different types of cognitive performance is quite consistent with both traditional and recent formulations concerning the psychological functioning of creative people (1, 3). The suggestion that fantasy plays an important part in the creative act has been a matter of record for centuries. At times irrational fantasy itself has been the subject of artistic effort as in *Kubla Khan* or the surrealist's landscape. More recently the relationship between fantasy and creativity has become the focus of psychological investigation, and empirical evidence supporting the intuitive insight of artists and poets is steadily increasing. If it can be assumed that the presence of atypical fantasy is also a rough indicator of a general *richness* of fantasy life, then the relative decline in the relationship between the Rorschach and cognitive performance as one moves from scholastic performance to tests of creativity becomes more understandable. Since the tests of creativity call for original or unconventional responses, rather than "right" answers, it would follow that the individual who possesses a rich (and perhaps, at times, bizarre) fantasy life would be at an advantage. Conversely, the absence of an extremely rich fantasy life might be somewhat of a blessing when confronted with cognitive tasks which require intensive and prolonged absorption in a highly rational system.

The meaning of school-grade differences in the relationship between psychological health and cognition remains rather obscure. Grossly interpreted, the findings suggest that psychological difficulties intrude into the cognitive performance of boys during the pre- or early adolescent period while the same phenomenon among girls does not occur until the junior year of high school. Since the general level of scores on the psychological health instruments shows no consistent age pattern, one can only assume that it is the quality rather than the quantity of the problems facing the students during these two periods that is important. Our general knowledge concerning the developmental problems facing adolescents during various periods suggests that the early adolescent period for boys is one in which physical maturity becomes crucial. It is during this period that general variability in size, strength, and the possession of secondary sex characteristics becomes most prominent. A tentative hypothesis would be that concern over delayed or extremely premature development during this period accounts for the general rise in the relationship between psychological health and cognition.

Girls, on the other hand, face an equally vexing set of problems in middle adolescence. These problems, rather than focusing on somatic changes, have as their general theme the resolution of social relationships. It is during this period that "chum" relations and involvement with "the crowd" gradually lose their appeal in favor of the more serious business of dating and "going steady." The demands which these more intimate hetero-

sexual relations make upon the psychological well-being of girls may serve to explain the increased relationship between psychological health and cognition during this period.

Summary

The relationship between psychological health and cognition in adolescence was examined using five psychological health criteria and eight types of cognitive performance. The subjects were 292 boys and 241 girls enrolled in a Midwestern private school.

The major findings indicated that the relationship under question shows systematic variability with school grade, sex, psychological health criteria, and type of cognitive function. In particular, the interrelationship between sex differences and the role of pathological fantasy pose a series of promising research questions. A tentative theoretical framework was suggested for a number of the major findings.

References

1. Barron, J. The psychology of the imagination. *Scientific American*, 1958, 199, 150-166.
2. Cattell, R. B. *Handbook for the objective-analytic personality test batteries*. Champaign, Ill.: Inst. Personality & Ability Testing, 1955.
3. Getzels, J. W., & Jackson, P. W. The highly creative and the highly intelligent adolescent: an attempt at differentiation. Paper read at Amer. Psychol. Ass., Washington, September, 1958.
4. Guilford, J. P., Kettner, N. W., & Christensen, P. R. A factor-analytic study across the domains of reasoning, creativity, and evaluation, I. Hypotheses and description of tests. *Reports from the Psychological Laboratory*, No. 11. Los Angeles: Univer. of Southern California, 1954.
5. Haggard, E. A. Socialization, personality, and academic achievement in gifted children. *Sch. Rev.*, 1957, 65, 388-414.
6. Harrower-Erikson, M. R., & Steiner, M. E. *Large scale Rorschach techniques*. Springfield, Ill.: Charles C. Thomas, 1945.
7. Jackson, P. W., & Getzels, J.W. Psychological health criteria among adolescents: a study of manifest and latent indicators. Paper read at Amer. Psychol. Ass., Washington, September, 1958.
8. Rapaport, D. *Diagnostic psychological testing*. Vol. 1. Chicago: Yearbook Publishers, 1945.

ATTITUDES OF MOTHERS OF FEMALE SCHIZOPHRENICS

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At least three recent studies have revealed certain family background differences between normal and schizophrenic males. Using interview methods, Gerard and Siegel (2) found group tendencies for schizophrenics to come from families where there was maternal overprotection and where fathers were nondominant and/or indifferent figures. The Experimental mothers regarded the environment as more hostile and showed more conflicting needs than did the Control mothers.

Gerard and Siegel suggest that the childrearing practices revealed in their study can plausibly result in the child's developing through learning the "typical" schizophrenic syndrome: "schizoid tendencies, heightened dependency needs, confusion of one's sexual identification or role, grandiosity, immaturity, and severe feelings of inferiority" (2, p. 21).

Mark (6) found 67 of 139 items on a childrearing attitudes scale to differentiate at the 5 per cent level or less between 100 mothers of schizophrenics and 100 mothers of normal males. Qualitative groupings of these items fit logically with Gerard and Siegel's results. The Experimental

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Child Develpm., 1960, 31, 299-305.

mothers, for example, held attitudes of both excessive devotion and cool detachment toward children and family life.

Freeman and Grayson (1), using Shoben's scale, get results which, while not highly significant, are in line with the two studies just mentioned.

Other studies (3, 4, 7, 9, 12) of backgrounds of schizophrenics have not separated men and women in analyzing their data. No controlled study of mothers of female schizophrenics has been reported. The present study seeks to compare the attitudes of mothers of female schizophrenics and mothers of normal females as measured by Form IV of the Parent Attitude Research Instrument (PARI), developed by Schaeffer and Bell (10) for the National Institute of Mental Health.

Method and Subjects

The PARI was chosen for the present study because it seems to represent the most careful selection to date of important items for assessing parent attitudes. The items were chosen by psychologists from their own experiences, from the discriminating items of the Shoben (11) and Mark (6) scales, and from factor analysis of a large pool of items used in preliminary investigation. Form IV consists of 23 five-item scales, 19 pathogenic and four rapport scales. The rapport scales allow a mother to express positive attitudes but have low reliabilities and were not analyzed in this study. Reliabilities of the pathogenic scales range from .54 to .77. Each scale name reflects the type of attitude it attempts to measure; for example, included in Form IV are scales called *Fostering Dependency, Marital Conflict, Strictness, Suppression of Aggression,* and *Dependency of the Mother.* An example of an item from one of the pathogenic scales is: "a good mother should shelter her child from life's little difficulties." The subject (*S*) circles one of four letters: A, a, d, D—indicating that he strongly agrees, mildly agrees, mildly disagrees, or strongly disagrees with the statement. There is a total of 115 items in Form IV.

Experimental *S*s were mothers of daughters who were hospitalized at the Mental Health Institute at Independence, Iowa, with a diagnosis of schizophrenia. From a total sample of about 300 case histories of schizophrenic females, 68 were found to include names and current addresses of natural mothers. Each was requested by mail to participate in the research. Failure to reply or to follow instructions, serious infirmity, death, and other factors reduced this number to a final Experimental group of 30 mothers.

Control mothers were women whose daughters had not sought professional help or been hospitalized for psychiatric problems. Most Control *S*s were obtained from women's clubs in and around Iowa City, Iowa. They were informed that the investigators were interested in learning what mothers who had experienced raising a family thought about children and family life. From a large number of *S*s 30 were selected that matched the Experimentals in mean age and education and who displayed a similar distribution of religious affiliations (*see* Table 1).

TABLE 1

MEAN AGE, EDUCATION, AND RELIGIOUS AFFILIATION OF EXPERIMENTAL AND CONTROL SUBJECTS

	N	*Mean Age of Ss**	*Mean Ed. of Ss**	*Mean Age of Daughters*	*Median Age of Daughters*	*No. Prot.*	*No. Cath.*
Control	30	58.6	11.4	33.2	35	23	7
Experimental	30	62.3	10.6	36.4	38	24	6

* *t* test nonsignificant.

ANALYSIS OF DATA

The data were analyzed by a treatments by levels design (5), using median age of daughter as the dividing point for levels. This procedure resulted in the proportionality of cell frequencies required by the statistical design. Direct use of the mother's age would not have produced this proportionality. The mean ages of the mothers in each cell are shown in Table 2, while median age of daughters is shown in Table 1.

Two analyses were carried out. In the first analysis each of the 19 pathogenic scales was analyzed separately. In the second analysis the scales were collapsed into two factors and the pooled data analyzed. The higher the score for any scale, the more pathogenic the attitude it measures is considered to be.

TABLE 2

MEAN AGES OF MOTHERS WHOSE DAUGHTERS FELL ABOVE AND BELOW MEDIAN AGE FOR DAUGHTERS

	Control	*Experimental*
Older	66.2	67.9
Younger	51.0	56.7
Grand Mean ...	58.6	62.3

RESULTS

On only two scales was the Experimental group significantly different from the Control group. These were No. 2, *Fostering Dependency*, and No. 3, *Seclusion of the Mother*. Scale No. 13, *Rejection of the Homemaking Role*, yielded a significant interaction between age and group. On No. 2 and No. 3 the Experimental mothers had higher mean scores than the Control

mothers. In all, on 10 of the 19 scales analyzed, Experimental *Ss* obtained higher mean scores than the Controls, though the differences were significant for only the two scales indicated.

Inspection of the data suggested that, since there were only five items per scale and only 30 subjects per group, variability of the scores may have been so great as to preclude detection of significant differences. Therefore, the scales were collapsed and the data pooled into the factors derived by Schaeffer and Bell from responses of a population of multiparae. This analysis collapsed the 19 scales into two groups: 15 scales on factor I, *Approval of Maternal Control of the Child,* and four on factor II, *Approval of Expression of Hostility.* (A third factor, *Approval of Positive Attitudes toward Childrearing,* can be identified significantly only with the rapport scales. It will be recalled that these were not analyzed in this study because of their low reliabilities).

Tables 3a and 3b report the analyses of the pooled scales. For factor I the main effects for Controls and Experimentals resulted in a significant difference at the 5 per cent level. A significant interaction was also obtained at the 5 per cent level. The table of critical differences shows that for factor I all groups were significantly different from each other except the Young Controls and Young Experimentals, and the Old Controls and Young Experimentals.

On factor II the main effects for Control and Experimental were not significantly different, though the interaction effect was. Analysis of simple effects showed two pairs of groups were significantly different.

TABLE 3

RESULTS OF ANALYSIS OF POOLED DATA

a. FACTOR I—APPROVAL OF MATERNAL CONTROL OF THE CHILD

	Means		*Table of Critical Differences*			
	Control	Exper.		YC	OE	YE
Older	12.20	13.77	OC	.75*	1.57*	.35
Younger	12.96	12.55	YC		.81*	.41
Grand Mean*	12.58	13.16	OE			—1.22*

b. FACTOR II—APPROVAL OF EXPRESSION OF HOSTILITY

	Means		*Table of Critical Differences*			
	Control	Exper.		YC	OE	YE
Older	12.80	13.42	OC	1.48*	.62	— .40
Younger	14.28	12.40	YC		— .86	—1.88*
Grand Mean	13.54	12.91	OE			1.02

* Significant at 5 per cent level.

The results for factor I, then, suggest that Experimental mothers seem to hold more pathogenic attitudes than Control mothers, the differences being especially marked for older mothers. Factor II reveals that younger Control mothers hold significantly more pathogenic attitudes than younger Experimental mothers and older Control mothers.

Discussion

The results of the analysis of the individual scales are inconclusive. It seems reasonable to suggest that present statistical techniques may not provide enough power to detect differences on five-item scales when there are only 30 subjects in each group. Of course, there may be no actual differences, or the PARI may not measure them.

The results for the pooled data on factor I support the reasoning that the variability of the individual scales under the conditions of the study was large enough to preclude significant differences. By pooling the data, 225 observations were included in each cell. Unfortunately, this collapsing of scales prevents meaningful discussion of whether the scales the Experimentals tended to agree with indicate conflicting feelings about childrearing and family life. For example, the scales that are included in factor I with which the Experimentals tended to agree involve pairs that, if considered individually, can be said to indicate attitudes that conflict with each other: *Dependency of Mother* vs. *Ascendancy of Mother, Fostering Dependency* vs. *Acceleration of Development,* and *Intrusiveness* vs. *Avoidance of Communication.* There are other scales on factor I such as *Deification, Martyrdom,* and *Inconsiderateness of the Husband* with which the Experimentals also tended to agree. These scales might suggest feelings of grandiosity and persecution.

But there are some scales on factor II, such as *Marital Conflict* and *Rejection of the Homemaking Role,* with which the Experimentals tended to disagree. A denial of the attitudes indicated by these two scales but agreement with attitudes indicative of feelings of grandiosity, such as are included in factor I, may suggest a lack of reality orientation.

The over-all results of collapsing the four scales significantly loaded on factor II are not clear. This may be a function of the relatively small number in each cell (60), which may not reduce the variability enough to enlarge the power of the test.

If the general interpretations of conflicting attitudes and possible reality disorientation are legitimate, they fit well with the findings of other investigators, especially those of Mark and of Gerard and Siegel. But probably the most that can be said is that the over-all tendency of the Experimentals to agree with *Approval of Maternal Control of the Child* does not conflict with the findings of other investigators. The items which make up this factor tend not to be in conflict with the clusters of attitudes indentified by Mark and by Gerard and Siegel.

It may be tentatively concluded that mothers of female schizophrenics hold different attitudes toward childrearing than mothers of normal females in directions and on dimensions that do not contradict the findings of differences in mothers of male subjects.

The over-all results are possibly more useful in thinking about the application of the PARI to small samples than in throwing light on the problem of this investigation. Perhaps, a form with more items in each scale and used with a larger number of *Ss* would have demonstrated the predicted differences on more of the individual scales.

Since collapsed scales do not give as much information as individual scales, employing Form IV of the PARI in a situation similar to the present study does not seem fruitful. While the gross results obtained do not contradict the findings of other investigators, the use of the PARI under conditions recommended above would provide a fairer test of the instrument for discriminating mothers of female schizophrenics and mothers of normal females. It must be concluded that Form IV did not do this in the present application.

Summary

1. Thirty mothers of normal females and 30 mothers of schizophrenic females answered Form IV of the Parent Attitude Research Instrument.

2. For two of the 19 pathogenic scales the mothers of schizophrenics showed a significantly higher mean score than the mothers of normal females.

3. When data were analyzed in terms of factors, the Controls had a significantly lower mean score than the Experimentals on factor I, and there was an interaction of age with group. For factor II there was a similar interaction.

4. While the results are not in disagreement with the findings of other investigators, data from pooled scales allow no real comparison of the obtained results with results of other studies.

5. It was concluded that using a form of the PARI that employed more items per scale and using a larger sample of subjects would provide a better test of the discriminality of the instrument. It was also tentatively concluded that mothers of female schizophrenics differed from mothers of normal females in ways similar to those in which mothers of male schizophrenics differ from mothers of normal males.

References

1. Freeman, R. V., & Grayson, H. M. Maternal attitudes in schizophrenia. *J. abnorm. soc. Psychol.*, 1955, 50, 42-52.

2. Gerard, D. L., & Siegel, J. The family backgrounds of schizophrenia. *Psychiat. Quart.*, 1950, 24, 47-73.

3. KASANIN, J., KNIGHT, E., & SAGE, P. Parent-child relationships in schizophrenia. *J. nerv. ment. Dis.*, 1934, 79, 249-263.

4. LIDZ, RUTH W., & LIDZ, T. Family environment of schizophrenic patients. *Amer. J. Psychiat.*, 1949, 106, 332-345.

5. LINDQUIST, E. F. *Design and analysis of experiments.* Boston: Houghton Mifflin, 1956.

6. MARK, J. C. The attitudes of the mother of male schizophrenics toward child behavior. *J. abnorm. soc. Psychol.*, 1953, 48, 185-189.

7. PLANK, R. The family constellation of a group of schizophrenic patients. *Amer. J. Orthopsychiat.*, 1953, 23, 817-825.

8. PROUT, C. T., & WHITE, M. A. A controlled study of personality relationships in mothers of male schizophrenics. *Amer. J. Psychiat.*, 1950, 107, 251-256.

9. REICHARD, S., & TILLMAN, C. Patterns of parent-child relationships in schizophrenia. *Psychiatry*, 1950, 13, 247-257.

10. SCHAEFFER, E. S., & BELL, R. Q. Development of a parental attitude research instrument. *Child Develpm.*, 1958, 29, 339-361.

11. SHOBEN, E. J., JR. The assessment of parental attitudes in relation to child adjustment. *Genet. Psychol. Monogr.*, 1949, 39, 101-148.

12. TIETZE, TRUDE. A study of mothers of schizophrenic patients. *Psychiatry*, 1949, 12, 55-65.

MANIFEST ANXIETY AND GAME PREFERENCES IN CHILDREN[1]

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PROBLEM

A number of studies have demonstrated important differences between children scoring high and low on measures of manifest anxiety. In classroom behavior highly anxious boys appear less academically adequate, show less task orientation, and manifest greater insecurity in the relationship with the teacher than do boys low on anxiety (5). In addition, the Rorschach performances and parent ratings of highly anxious boys show them to be indecisive, dependent, and affectionate (2, 6). Sarason, Davidson, Lighthall, and Waite (6) have advanced the hypothesis that "our culture makes it much more difficult for a boy than for a girl to admit explicitly to anxiety (or weakness). For a girl to admit to anxiety is not as likely to impair her own or others' evaluations of her femininity as a similar admission in a boy would impair his own or others' evaluation of his masculinity" (p. 284). This description of highly anxious boys as indecisive, dependent, affectionate, and more prepared to admit to anxiety or weakness has suggested to the authors that highly anxious boys show stronger identification with femininity than do boys low on anxiety.

The present paper pursues the thesis arising out of these investigations that highly anxious boys show stronger identifications with femininity than do boys low on anxiety. It seemed useful at the same time to investigate possible variations in the role perceptions of highly anxious girls, particularly as these girls appear to be more achievement-oriented, serious, and nondistractable than girls of low anxiety (5). These traits indicate that they are at least more "active" than girls low on anxiety and that they perhaps may be more masculine. Sarason's findings suggest, however, that differences between highly anxious girls and those low on anxiety will not be as great as those between highly anxious boys and boys low on anxiety.

PROCEDURE

It has been demonstrated that a play check list upon which children indicate their preference for games provides a simple and valid measure of masculinity or femininity of interest (3, 8). In this study a revised 181-item

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form of the Terman Play Inventory was used (4). This list was administered to 187 children in the fourth, fifth, and sixth grades, and an item analysis was conducted on the basis of sex and game preference. Analysis yielded 18 items chosen more frequently by boys than girls ($p = .05$) and 40 items chosen more frequently by girls than boys ($p = .05$). These basic lists were then used for judging the relative masculinity or femininity of boys and girls high and low on anxiety (HA and LA, respectively). It was hypothesized that:

a. HA boys, as compared with LA boys, should indicate a greater preference for feminine items;

b. HA girls, as compared with LA girls, should indicate a greater preference for masculine items;

c. if HA boys and HA girls are compared on game preferences, they should, if the above hypotheses are confirmed, differ from each other on fewer items than those contained in the basic criterion lists.

Results

The children's manifest anxiety scale (CMAS) (1) and the play check list were administered to 351 children in the fourth, fifth, and sixth grades of two elementary schools. An analysis was conducted of game preferences of boys and girls in the upper and lower quartiles on the CMAS.

Table 1 lists the items which differentiated boys high and low on anxiety ($p = .10$). When the HA boys ($N = 42$) were compared with the LA

Table 1

GAME PREFERENCES DIFFERENTIATING BOYS IN THE UPPER AND LOWER QUARTILES ON THE CMAS

High Anxiety	*Low Anxiety*
*school (F)**	*collections (N)*
fox and geese (F)	hiking (N)
in and out the window (F)	actors (N)
crack the whip (F)	scrapbook (F)
musical chairs (F)	dance (F)
tail on the donkey (F)	darts (M)
I spy (F)	
puzzles (F)	
store (F)	
hide the thimble (F)	
Mother, may I? (F)	
church (N)	

* M refers to items chosen significantly more often by males; N refers to items which fail to discriminate between the sexes; F refers to items chosen significantly more often by females (4).

boys ($N = 39$), the former showed a marked preference for games typically chosen by females. Only one item preferred more by HA boys was "neutral"; i.e., it failed to discriminate between the sexes on the original criterion list. The LA boys showed significantly greater preference for six items, three of which were neutral, two feminine, and one masculine. These results lend support to the first hypothesis.

TABLE 2

GAME PREFERENCES DIFFERENTIATING GIRLS IN THE UPPER AND LOWER QUARTILES ON THE CMAS

High Anxiety	*Low Anxiety*
London bridge (F)*	houses (F)
mulberry bush (F)	draw or paint (F)
garden (F)	blind man's bluff (F)
dressing up (F)	crack the whip (F)
in and out the window (F)	statues (F)
see saw (F)	clue (F)
farmer in the dell (F)	collections (N)
leap frog (F)	hoops (N)
scrap book (F)	
kissing (N)	
shuffleboard (N)	
crochet (N)	
kick dodge (N)	
post office (N)	
black magic (N)	
fish (N)	
knit (N)	
wrestling (M)	
use tools (M)	
bowling (M)	
hunt (M)	

* M refers to items chosen significantly more often by males; N refers to items which fail to discriminate between the sexes; F refers to items chosen significantly more often by females (4).

Table 2 presents the items which differentiated girls high and low on anxiety ($p = .10$). When HA girls ($N = 43$) were compared with LA girls ($N = 45$), though the former show a significantly greater preference for four masculine items, the two groups were not otherwise clearly differentiated in terms of masculinity-femininity. It is concluded that these results fail to confirm the second hypothesis.

When HA girls ($N = 43$) were compared with HA boys ($N = 42$), the masculinity-femininity distinctions established on the total population

were not maintained. Of the 18 items differentiating boys from girls ($p = .05$), six now failed to do so. Of the 40 items differentiating girls from boys ($p = .05$), 24 now failed to do so. It appears that some of these changes resulted from the preferences of HA boys for girl games, and some from the preferences made by HA girls for boy games. Tentatively, the results tend to give evidence on behalf of the third hypothesis.

Discussion

The results tend to be in the direction hypothesized, but the tendency for HA boys to choose feminine games is more pronounced than the tendency for HA girls to choose masculine games. This greater distinction among boys is consonant with the findings on the Rorschach behavior of children high and low on anxiety (6).

Examination of the few available sources on the developmental significance of games (3, 7) indicates that the 11 feminine games chosen by the HA boys are those most typical of girls in the first three school grades, while the two feminine games chosen by the LA boys are more typical of fourth, fifth, and sixth grade girls. The data thus suggest that the game preferences of highly anxious boys are not only feminine, but that they are also immature. The four masculine games chosen by the HA girls, on the other hand, are more typically chosen by boys either in, or in advance of, the fourth, fifth, and sixth grades. Their choices appear to represent an interest in more mature masculine pastimes.

It may be concluded that the anxiety measured by the CMAS is related to variables in the area of sex-role identification. This is a confirmation of Sarason's view that the sex of the respondent is related to willingness to admit to anxiety (6). In two respects, the HA boys are more like girls, in high scores on the CMAS and in their feminine game choices. In fact, a general comment to be made upon this scale as a unidimensional personality inventory is that "anxiety" accounts for only a portion, and that an unknown portion, of its variability (1).

Summary

The present study sought to compare the play preferences of highly anxious boys and girls. It was hypothesized that for highly anxious children each sex would show a greater preference for the games of the opposite sex than that found in the total population. The results partly supported this hypothesis and led to the interpretation that the measurement of anxiety on the CMAS is related to variables in the area of sex-role identification. Further interpretation of the game preferences led to the conclusion that game choices of highly anxious boys were not only feminine, they were also immature, and that some of the game choices of highly anxious girls were both masculine and above average in maturity level.

References

1. Castaneda, A., McCandless, B. R., & Palermo, D. S., The children's form of the manifest anxiety scale. *Child Develpm.*, 1956, 27, 317-326.
2. Davidson, K. S., Sarason, S. B., Lighthall, F. F., Waite, R. R., & Sarnoff, I. Differences between mothers' and fathers' ratings of low anxious and high anxious children. *Child Develpm.*, 1958, 29, 155-160.
3. Lehman, H. C., & Witty, P. A. *The psychology of play activities.* New York: Barnes, 1927.
4. Rosenberg, B. G., & Sutton-Smith, B. A revised conception of masculine-feminine differences in play activities. *J. genet. Psychol.*, 1960, 96, 165-170.
5. Sarason, S. B., Davidson, K. S., Lighthall, F. F., & Waite, R. R. Classroom observations of high and low anxious children. *Child Develpm.*, 1958, 29, 287-295.
6. Sarason, S. B., Davidson, K. S., Lighthall, F. F., & Waite, R. R. Rorschach behavior and performance of high and low anxious children. *Child Develpm.*, 1958, 29, 277-285.
7. Sutton-Smith, B. *The games of New Zealand children.* Berkeley: Univer. of California Press, 1959.
8. Terman, L. *Genetic studies of genius.* Vol. I. Palo Alto: Stanford Univer. Press, 1926.

THE EFFECT OF A VARIABLE CONDITIONED STIMULUS UPON THE GENERALIZATION OF AN INSTRUMENTAL RESPONSE

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Recent report has been made of two experiments using a rate of response measure to study transfer in children. During each training trial, *S* pulled a handle repeatedly, receiving a marble for each pull. Then, test trials to novel stimuli were conducted without marble delivery.

The first study (9), using stimuli varying in color, showed that a novel stimulus elicited a greater number of responses after 24, as compared with 12, trials of training to respond to a similar stimulus. The second study (10), using stimuli equally spaced on a logarithmic scale of stimulus intensity, confirmed those results. A gradient of response was found, decreasing as the test stimuli became less similar to the training intensity. Comparison of *S*s trained at either end of the intensity dimension showed the bright-trained *S*s manifesting a gradient of steeper slope than did the dim-trained group.

These principal results, and secondary findings, agree with properties of the theoretical mechanism of stimulus generalization advanced by Hull (2, 3) primarily on the basis of human classical conditioning and animal data. They suggest that this mechanism may be used to explain transfer in this situation.

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Some questions about generalization for which child *Ss* are suitable were suggested in the second report. The present investigation is concerned with the effects of training with several stimuli. An experimental (E) group had eight training trials to each of three stimuli (S_1, S_2, and S_3) of a series of six differing progressively in hue and intensity. A control (C) group had 24 training trials with S_3. Following training, both groups received test trials on S_3, S_4, S_5, and S_6. The expectation was that learning to respond to different stimuli might encourage Group E to generalize, so that it would give the greater number of responses during test trials with novel stimuli.

Method

Subjects

Children of the Iowa Child Welfare Research Station Preschools were divided into older (52 to 61 months) and younger (42 to 54 months) age levels. Most of the older children had been used in a variety of previous research; the younger children were relatively naive. The factor termed "Age" in later analysis, then, is confounded with experimental experience. The *Ss* at each age level were divided, by lot, between the two treatment groups.

Four children were introduced to the apparatus, but failed to respond regularly (more than once or twice per trial) during practice. Another was not used because of a mechanical failure. There remained 16 *Ss* in each group, eight younger and eight older.

Apparatus

The apparatus previously described by Spiker (9) has been rehoused in five separate units. The Stimulus Unit is a black wooden box 13¼ in. high, 5⅜ in. wide, and 7¾ in. deep. Centered 4 in. down from the top of the box is a circular opal-flash window 3⅛ in. in diameter. Six 75-w. projection bulbs are seated in two horizontal rows of three, the tops of them 5¼ in. from the bottom of the box. Directly over the bulbs is a metal frame which holds the appropriate filters and diaphragms for the stimuli to be used. Tin reflector panels lining the interior direct an even color into the stimulus window.

The Response-reward Unit is a black wooden box. Projecting from its lower right hand corner is a wooden response handle. Under reward conditions, each pull of the handle causes a solenoid to eject a marble into an attached plastic cup. Copper tubing, extending 12 ft. along the walls of the room, holds the reservoir of marbles.

(Both the stimulus and response-reward units were placed at chest level for a preschool child on a shelf attached just below a one-way mirror. A fan was used to mask apparatus noises associated with onset of the stimuli. The *E* sat in a small room behind the mirror, observing *S* and recording responses.)

The Control Unit contains a stepping switch wired to present automatically, depending on the position of a selector switch, one of the two training or four testing sequences of lights. The Timer Unit, consisting of two Hunter timers, controls the duration of the stimulus presentation (3.5 sec.) and the interstimulus interval (2.5 sec.). The Counter Unit consists of six counters, each assigned to one light. When its light is on, a counter records the number of pulls to the response handle.

Stimuli

The six stimulus hues and their corresponding filters (Corning Glass Co., unpolished) were: (a) a yellowish white, No. 3418; (b) a lemon yellow, No. 3385; (c) a yellowish orange, No. 3484 over No. 3486; (d) a deep orange, No. 3482 over No. 3307; (e) a reddish orange, No. 2434; and (f) a deep red, No. 2030. The brightness of each stimulus was measured with a Macbeth Illuminometer and adjustments were made, using diaphragms and opal-flash filters, to arrange a monotonic sequence of intensity. The adjusted brightnesses, in apparent ft.-candles, of stimuli a-f were 214, 108, 55, 25, 15, and 2.

Procedure

The *S* was first allowed to select a toy from a stock on a table; this was the toy he was to try to win in the "game." The *E* pulled the handle for two trials to demonstrate the apparatus and then encouraged the child to pull as rapidly as he could for six trials. Preliminary training for each *S* was done with his appropriate (constant or varied) stimuli and with marble delivery.

The *E* then, with the child's permission, turned on the masking fan and left the room. Some 30 sec. later, the presentation of the 24 reinforced training trials began. Presentation order of the three Group E stimuli was the same for all *S*s in that group.

The testing sequence began following some 10 sec. to reset the controls and consisted of 20 trials, eight test trials interspersed irregularly among 12 reinforced presentations of S_3. Either one or two reinforcements separated the test trials, except that between test trials 4 and 5—that is, between cycles 1 and 2—there were three. A cycle is defined as the complete test presentations, in some order, of stimuli 3, 4, 5, and 6. Four testing sequences counterbalanced order of stimulus presentations within cycles. Each sequence was embedded in the same pattern of interspersed reinforcements.

Results

Acquisition

Over the 24 training trials, Group C averaged, for the younger *S*s, 4.9 pulls per trial and, for the older *S*s, 4.5 pulls per trial. The corresponding subgroups of Group E averaged 4.7 and 5.2 responses per trial. The differ-

ences among the subgroups were manifested chiefly during the early portion of training. Analysis of variance (4) applied to the data of the last half of training, with Trials, Treatments, and Age as factors, showed no significant entries.

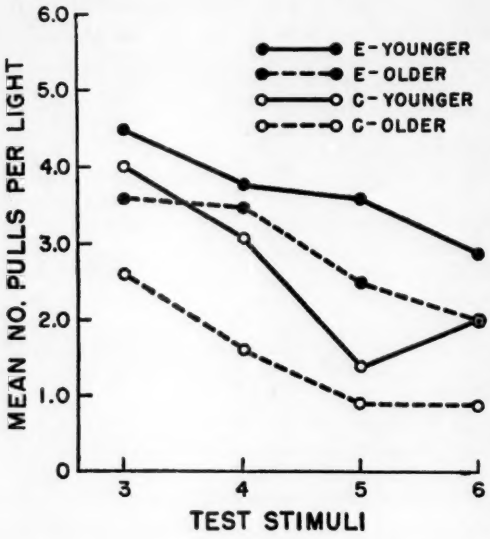

FIGURE 1—Mean number of responses to test stimuli by treatment subgroups.

Test Trials

Figure 1 shows the mean number of responses given to the test stimuli by each treatment subgroup. The following trends are seen: (a) decreasing responsiveness to stimuli less similar to the training stimuli; (b) more generalized responses, at both age levels, for Group E than for Group C; (c) combining age levels, a steeper slope of the curve for Group C than for Group E; (d) more generalized responses, for both treatment conditions, at the younger age level. Not shown, for simplicity, is (e) a marked decrease in responses from the first to the second cycle of test trials.

An analysis of variance applied to the number of responses given during test trials to all four stimuli confirmed the five trends noted above (Table

1). The same analysis was done using only responses to the novel test stimuli—S_4, S_5, and S_6. The results of this analysis were essentially the same as those tabled, except that the Training × Stimuli interaction reached only the 10 per cent level of significance.

TABLE 1

SUMMARY OF ANALYSIS OF VARIANCE OF THE NUMBER OF RESPONSES TO THE FOUR TEST STIMULI

Source	*df*	*Mean Square*	*F*	*p*
Between Subjects:	31			
Training (T)	1	100.00	10.66	.005
Age	1	64.00	6.82	.025
error (b)	28	9.38		
Within Subjects:	224			
Stimuli (S)	3	41.60	29.18	.001
Cycles	1	36.00	16.42	.001
T × S*	3	3.94	2.76	.05
error (w)	196			
$error_1$ (w)	84	1.43		
$error_2$ (w)	28	2.19		
$error_3$ (w)	84	1.85		
Total	255			

* Other interactions omitted, since none significant at less than the 20 per cent level of confidence.

DISCUSSION

The finding of significant differences in response rate to test presentations of S_4, S_5, and S_6 is probably attributable to differing generalization from the training stimuli. It might also be interpreted as due to the fact that these stimuli progressively diminished in intensity, since a variety of evidence (3) suggests that decrease in CS intensity is associated with decrease in response tendency. Neither interpretation of the gradient vitiates a comparison between the groups' tendencies to generalize on the basis of these data.

The finding that varied training led to greater generalization than did constant training might be explained by habit summation, resistance to extinction, or set mechanisms. The first would suppose that, by processes of summation outlined in Hull's system (2), generalized habit strength for Group E from S_1, S_2, and S_3 exceeded that from S_3 for Group C. But other evidence cannot be similarly explained. In a study similar to the present one,

Riopelle and Rogers (8) compared *Ss* with constant and variable training for generalization on a spatial dimension. The *Ss* were faced with a group of 13 lights arranged in a 7×7 cross. A group trained to respond to all lights in the column showed more generalization to lights on the row than did another group given an equal amount of training to the center light alone. A habit summation mechanism could only predict that this variably trained group should show less or equal generalization compared with its control group.

Two recent animal studies (5, 6) suggest that training under variable stimulus conditions produces greater resistance to extinction than does equal training under constant conditions, although in another such study (1) the authors concluded that resistance to extinction was not affected. Here, a consecutive series of nonrewarded test trials were combined in the generalization measure, and it is possible that the differences between the experimental and control groups were a result of resistance to extinction rather than generalization.

It is of some interest, in this connection, that on their first test trial *Ss* in Group E gave a mean of 4.6 responses, as compared with 3.3 for *Ss* in Group C ($p < .10$). However, in this procedure, unlike most other methods of studying generalization, behavior on the first test trial may reflect resistance to extinction since the multiple responding feature calls for *Ss* to keep responding after nonreinforcement in that trial.

A set explanation might hold that Group E children, having learned to make a uniform response to differing stimuli, would show lessened resistance to extending that response to new stimuli—perhaps because of an explicit adoption of the principle that the response is to be widely attached, perhaps because of a lessened tendency to orient to distinctive features of new stimuli. This possibility was noted by Riopelle and Rogers (8).

It is of incidental interest that the finding of more generalized responses for younger than for older *Ss*, although here possibly a product of experimental experience, has also been reported by Mednick and Lehtinen (7), who used naive elementary school children as *Ss*.

Summary

Generalization following training to several stimuli was compared with that following training on a constant CS. Using a free-responding apparatus, where pulls to a handle delivered marbles during the 3½ sec. that the CS was on, 16 preschool children received eight presentations of each of three colored lights. A control group of 16 children had 24 training trials with a constant stimulus. Two cycles of counterbalanced tests for generalization on a series of stimuli differing in hue and intensity were given to both groups. There were no significant differences over the last half of training. The variably trained group generalized significantly more than did the control group.

References

1. Brown, J. S., & Bass, B. The acquisition of an instrumental response under constant and variable stimulus conditions. *J. comp. physiol. Psychol.*, 1958, 51, 499-504.
2. Hull, C. L. *Principles of behavior.* New York: Appleton-Century, 1943.
3. Hull, C. L. Stimulus intensity dynamism (V) and stimulus generalization. *Psychol. Rev.*, 1949, 56, 67-76.
4. Lindquist, E. F. *Design and analysis of experiments in psychology and education.* Boston: Houghton Mifflin, 1953.
5. Mackintosh, I. The resistance to extinction of responses acquired under irregular conditions of learning. *J. comp. physiol. Psychol.*, 1955, 48, 363-370.
6. McClelland, D. C., & McGown, D. R. The effect of variable food reinforcement on the strength of a secondary reward. *J. comp. physiol. Psychol.*, 1953, 46, 80-86.
7. Mednick, S. A., & Lehtinen, L. E. Stimulus generalization as a function of age in children. *J. exp. Psychol.*, 1957, 53, 180-182.
8. Riopelle, A. J., & Rogers, J. P. Transfer of training to orthogonal dimensions. *J. exp. Psychol.*, 1956, 52, 367-370.
9. Spiker, C. C. The effects of number of reinforcements on the strength of a generalized instrumental response. *Child Develpm.*, 1956, 27, 37-44.
10. Spiker, C. C. The stimulus generalization gradient as a function of the intensity of stimulus lights. *Child Develpm.*, 1956, 27, 85-98.

THE STAGES OF MATURATION IN SOCIALIZED THINKING AND IN THE EGO DEVELOPMENT OF TWO GROUPS OF CHILDREN[1]

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OBJECTIVES AND THEORETICAL FRAMEWORK

This study was designed to investigate the levels of thought and behavior associated with the development of socialization in two groups of young children. The subjects' levels of social maturity were assessed from two points of view. First, the children were evaluated in terms of Piaget's categories of practice of rules and consciousness of rules (8, 9). Piaget observed boys in games of marbles, interrogated them on their conceptions relating to the games, and found a progression of recognizable patterns of social thinking and behavior at different age levels. In the present study this approach was used for purposes of assessment and comparison, i.e., to describe the stages of maturation of normal and mentally retarded subjects. Second, the corresponding phases of ego development in the same children were examined by analyzing their TAT protocols. In thus evaluating the children's stages of growth in social behavior and attitudes on the one hand and in ego development on the other hand, the writer attempted to interrelate two theories of human development on an empirical level. The theory of genetic mental development as set forth by Piaget and that of ego development as described within the psychoanalytic literature (1, 2, 3, 4, 5, 6, 10) appear to be complementary and consistent. Since the two viewpoints converge in the roles they each assign to genetic and sociocultural factors in influencing maturation processes, one would expect to find their stages of development proceeding concurrently.

Both in Piaget's approach and in psychoanalytic psychology, maturation is held in large part to be dependent upon the genetic growth of perceptual ability. The child's view of his environment progresses from subjectivity to objectivity, from autism to realistic awareness of self and others. The progress of mental growth, as set forth by Piaget, and ego development both depend upon the differentiation of self internally and in relation to the

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outer world. This differentiation brings about an increasingly objective awareness of reality.

The level of perception of the child affects the character of his assimilation, or utilization of past experience, and of his accommodation, or adaptation to new experience. Assimilation and accommodation are the dynamic elements which explain growth in the Piaget system. Correspondingly, in the psychoanalytic approach, the behavior and value system of the individual reflect the kinds of cumulated responses made by the ego to its internal as well as external experiences. Integration of values into the ego, or reconciliation of internal and external experiences, is similar in effect to the joint operation of assimilation and accommodation. However, in considering the growth of socialization, Piaget focuses his attention on a description of the succession of perceptive structures; while psychoanalytic psychology directs itself to the examination of the forces underlying ego development.

The present study was designed within these two approaches to the analysis of child development. The methods of obtaining data, the criteria for evaluating stages of development, and the explanations of the findings were cast in the appropriate theoretical orientations. The nature of the articulation between growth in mental process and in ego development was expressed in a description of behavior characteristic of the levels of development in each area.

Methods

By means of observation and interrogation, data were acquired illustrating practice of rules and consciousness of rules. Each child played marbles, first, by himself in a demonstration game, and, second, with the investigator. Following the game, there was a discussion with each child about his conceptions of the game. The entire proceedings were tape recorded. Examples of the types of information considered to be reflective of practice of rules included: use of boundaries, succession of turns, playing for keeps, penalties, application of verbal expressions, consistency between spoken rules and observed behavior, complexity of rules observed, requirements for winning, handling of accidental factors, shooting regulations, and flexibility of the rules. The inquiry into consciousness of rules pertained to the structure and background of the game and the origin and purposes of rules. The normal and mentally retarded children were classified[2] into stages of development on the basis of specific criteria established by the writer within the characteristics of behaviors at successive stages as described by Piaget.

At a separate session from that in which the marble games were played, the TAT was administered to each child participating in the research project. Using categories formulated by Henry (6) for analyzing TAT

[2] To establish scoring reliability, a random sample of eight observations were analyzed by another psychologist. A Pearson r of .72 was obtained when his scores were compared with those obtained by the writer.

data, the writer defined a sequence of four successive levels of ego development within each category. These criteria were used to determine the stage of ego development[3] for each subject. The data were thus collected and classified so that comparisons could be made for normal and mentally retarded children at four age levels (mental age) in practice of rules, consciousness of rules, and ego development.

The 64 children, all boys, who participated in the study were enrolled in the regular grades or in the classes for mentally retarded children in the Detroit Public Schools. Thirty-two of the children, those in the regular grades, had IQ ratings of 90 or more, while the mentally retarded group had IQ ratings ranging between 60 and 80. The children of normal intelligence were apportioned into four age groups, with eight boys in each, at these chronological ages: 6, 8, 10, and 12. Similarly, the mentally retarded children were distributed into four age groups, except that the chronological ages were: 8, 10, 12, and 14. The mentally retarded children enrolled in these special classes had been evaluated as educable by the psychological clinic staff. Behavior problem children and children with known physical or neurological disabilities are not assigned to these classes. Children in the special classes for the mentally retarded in the Detroit Public Schools are considered to lag behind the pupils in the regular grades by two years in mental age. Comparisons were made between groups of subjects assumed to be at approximately the same mental age.

The participating schools were selected upon the recommendation of the Director of Research of the Detroit Public Schools. The school neighborhoods represented were predominantly of the middle socioeconomic class according to his criteria.

Findings

Two groups of findings emerge from the present study: (a) a descriptive delineation of the sequence of developmental stages as observed in children at four age levels; (b) comparisons of the relative levels of development in normal and mentally retarded children in the areas of practice of rules and consciousness of rules on the one hand and in ego development on the other.

Developmental Stages

The delineation of developmental stages provides the basis upon which the normal and mentally retarded children were compared. The important role assigned to the concept of stages in this investigation of social thought and behavior rests upon a concentration of the behavior characteristics of groups of children in a series of discernible, cohesive patterns. In the Piaget framework behavior is explained in terms of levels of development in mental

[3] As a reliability measure, a psychologist also rated a sample of eight of the TAT protocols. His scores showed a correlation of .81 (Pearson) with those obtained by the writer.

process. Differences among children whose functioning is generally typical of a particular level are attributed to *decalages*. Piaget used this term to refer to characteristics predominant in one stage, but presenting a premature or delayed appearance in certain situations or contexts in other stages. The extent and kind of this overlapping of stages were observed to vary from child to child. Such interdigitating eludes descriptive generalization and can be clearly manifested in the case study material alone.

The stages of development in mental process which were analyzed in the present study are generally consistent with the findings of Piaget concerning maturation in the areas of practice of rules and consciousness of rules. Examination of the observational material revealed that the periods of egocentricity and obligatory rules could be divided into earlier and later phases. On the basis of the data in the study, the writer was able to elaborate upon the work of Piaget in identifying aspects of social thought and behavior representative of successive stages of development.

In terms of the Piaget framework in which the research was cast the behavioral *function* investigated is socialization. The differentiating characteristics of the thought and behavior associated with socialization at the successive levels observed constitute the *structures* which are seen to vary as the child matures. The first stage is predominantly one of assimilation as the child's play activities appear to be directed by internal and personal motivations. In the second stage, assimilation and accommodation alternate in influencing mental process. In his game behavior the child vacillates between individualistic play and attempts at conformity. Accommodation frequently achieves the upper hand in the third stage as the child seeks to emulate and incorporate the standards of his society. In the fourth stage assimilation and accommodation are found to work together in situations where the child adapts to new experiences within the context of previously integrated experiences.

Practice of rules and consciousness of rules. A hierarchy of five types of games of marbles was distinguishable in the writer's observations of the children's play. The game schemas differed from each other in the degrees of internal consistency and complexity of the rules and in the extent and character of the relationships among the players.

The marble play of the first stage was wanting in orderly, consistent structure. The boys felt free to use the marbles in ways of their own choosing. Some of the children took one or two marbles while others gathered large masses. The impulsively organized actions made it difficult to find any predictable pattern in the number of turns a player received. In their comments the children did not express the feeling that their games should be veered toward the versions played by others. In general, they appeared to be quite content with their avowedly individualistic interpretations of the marble game and did not wish to emulate the games they had seen.

In the first stage the children did not employ any rules in their marble play. Although the child at this level can and does adhere to adult directives,

he cannot conceptualize or implement interpersonal relationships resting upon such mutual obligations as are specified in rules.

A simple circle game, varying considerably among players, was frequently played by children in the second, or early egocentric, stage of development. Consistent elements of organization in this game included the establishing of a boundary, a definite sequence of turns, and a goal, that of hitting marbles. Children at this level do not play for keeps. They are unable to relinquish their ownership of marbles as a contribution to the group relationship.

In determining the winner, in handling accidental factors, and in choosing players and marbles, the reasoning of the child appears to be arbitrary. Inflexible utilization of the rules by the child in the second stage indicates that he does not understand their purposes. While the child refers to authoritative sources to lend support to his game, he does not offer any rationale to explain the rules he uses. Extensive improvising of rules was observed by the writer although the children were confident that their games were replications of those played by mentor groups. The child's conscious conception of marbles was that the present game is an image of the games of the past and a presage of these in the future.

In the second stage the child's cognizance of the game behavior of others is accompanied by a desire to repeat the actions he observes. The child wishes to participate with others in common activities and perceives that such relationships are based upon a certain degree of personal accommodation to external requirements. The powerful forces of assimilation, however, prevent the child from exhibiting consistently compliant and conforming behavior. With immature perceptive ability he can not acquire command of the details of the games he seeks to emulate. Furthermore, his enjoyment of repetitive motor practice and immature control of his impulse drives continue to be important motivating factors.

With advancement in perceptual ability and greater interest in group play, the child in the third, later egocentric, period is more able and willing to accommodate his behavior to standard game procedures. The game *chasers* was frequently played during this period, with little variation noted in the structure of this game as it was demonstrated by the different boys. The objective of the preceding stage, that of just hitting marbles, is now succeeded by the goal of winning and keeping marbles, a development which points in the direction of greater socialization. In general, the rules to the game are more elaborate and cover many of the diverse conditions of game action.

Children in the third stage find it difficult to modify their methods of playing or their conceptions of the game. They have already accommodated their behavior to external models and consequently are reluctant to accept the idea that the rules can be altered, thereby requiring changes in their actions. Furthermore, the rules to the game are considered to have authoritative sanction and hence ought not be revised.

Although the rules are considered to have a traditional origin, the children in this period begin to find reasons to explain their practices. The explanations offered may be directly appropriated from the statements voiced by others, but nonetheless they represent the germ of the kind of thinking manifested in the next stage. At this point, however, the children do not articulate awareness of the evolutionary aspects of rule development nor of the role of group process in this development. They rely with confidence upon precedence and direction, endeavoring to adapt their actions and thinking to the standards established by their superiors.

The primary purpose of rules, according to most of the children, was to prevent cheating. Assigning this function of control to the rules indicates a lack of confidence in the ability of all players to suppress private wants in order to maintain group association. Comments concerning fairness reflected a concern that a readily attainable degree of skill be required for winning. The subjects did not discuss fairness in terms of equal opportunity as a desirable base for socialization.

While behavior was predominantly individualistic in early egocentricity and characteristically conforming in later egocentricity, the period of cooperation and mutual consent is marked by a balance between these two tendencies. The ability of the child to evaluate the perspectives and interests of others lies at the foundation of "cooperative" relationships. Players are able to recognize conflicting interests among themselves, and the essence of competitive games is the willingness to reconcile these divergences on the basis of elements of commonality. Assimilation and accommodation now operate conjointly.

A complex circle game was generally played during the fourth stage. The elaboration found in the rules to this game and in other marble games of the period reflects a more rational approach to the functions of rules. For example, a flexible use of the circle line indicates an understanding of the reason behind the rule, namely, that all boys should begin to shoot from points equidistant from the target. When this condition has been met, play within the boundary is permitted. Presumably, the reasoning underlying this regulation is that competitive skill and planning, rather than chance alone, should determine the course of actions subsequent to the initial shooting. Similarly, the right of superior skill to commensurate reward is illustrated in the granting of additional turns for successful shooting. Group agreements regarding the introduction of specific verbal expressions allow sets of players to select versions of the game in line with their joint inclinations.

In the cooperative stage the child is aware that many of the regulations of play, such as the number of players and the list of acceptable verbal expressions, are determined by group process. Moreover, he recognizes the game to be a summation of the experience and thinking of generations of marble players. Thus, he is willing to consider modification of the rules to his game when the changes are derived through mutual consent. In

articulating his opinions pertaining to possible changes in the rules suggested by the writer, the child now was found to consider factors other than source and sanction in evaluating the merits of a proposed rule. A new rule is acceptable if it is reasonable and just according to the child's own conceptions of these terms and if it serves the amalgamated interests of the individual players. The purpose of the rules is the maintenance of equal advantage among players so that winning depends upon skill rather than fortune. A set of fair rules must include recognition of special conditions which affect the relative chances of the players.

The game behavior of the children in the fifth stage is very similar to that described as typical of the fourth. A highly elaborate set of rules and an advanced degree of technical skill are the only differentiating factors between these two levels. A game called *pots* exemplifies the behavior of this period. The player is required to shoot his marble through a sequence of five different holes before he is allowed to shoot at the marbles of the other participants. There is thus an additional element of competition in this game as the players contend in terms of relative speed in progressing through the series of holes as well as in the hitting of opponents' marbles.

Ego development. The progress of ego development was delineated within categories established by Henry[4] for analyzing personality data from TAT protocols. The first category, direction of emotional energy in solving problems, was considered to be an important indication of the level of ego maturity. The emotional energy of the child in stage one is in large part directed toward identifying external cues and placing them into a simple organizational pattern. The themas consisted of simple enumeration of stimuli which were oftimes repeated. Little awareness of conflict or problem was expressed. Hence, outcomes or solutions could not be posited. The lack of plot structure in the themas finds its counterpart in the spontaneous and undirected action observed in the marble games of the motor period.

While many of the themas of the second stage contained statements of conflicts or problems, the manner of solution was essentially nonconstructive, taking the form of magical wish fulfillment, for example. Practical methods for implementing solutions were not suggested. The children simply revealed an underlying confidence that powers exist which can solve problems to the satisfaction of everyone. The child is not able to gear action between purpose and consequences.

In the TAT themas of the third stage the action taken is usually initiated by adult figures for the benefit of the child. Thus, the child is dependent upon others for help in solving the conflicts which he has posited. The purpose of the action frequently was directed toward resolving and controlling elements of fear and anxiety. Many of the children projected concern over the consequences of nonconforming behavior.

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[4] William Henry, "An analysis of fantasy." (Committee on Human Development, Univer. of Chicago, 1950) Pp. 39-53. (Dittoed)

In the fourth stage of ego development the child assumes a considerable degree of independence in searching for solutions to his problems and in implementing action. Nonetheless, he still solicits the aid of others when he cannot or does not wish to rely upon himself. In this stage the child's approach toward solving the problems posited in the themas is cautious and evaluative. He is often able to predict the consequences of action.

The categories designated as attitude toward inner life and system of control were also investigated as being indicative of level of ego development. Passive language and minimal affective expressions typified the TAT responses of the child in the first stage of ego development. In the opinion of the writer the processes of identification and projection were not sufficiently developed to enable these children to transfer their emotional life to the figures on the TAT cards. By contrast, an effervescent display of desires and impulses was found in the responses at the second stage. In projecting his feelings into the stories, the child frequently talked about "I" directly. Foods and eating, representing both pleasure and dependence, were introduced into many of the stories. Problems of inner control appear in the second stage as the child communicates feelings which cannot be fulfilled. Unable to alter the circumstances which prevent this fulfillment or to control his emotions by channeling them into more expedient directions, the child expresses frustration and sometimes even fatalism. Several of the plots involved pretending, which offers a way out of this dilemma. By posing conflict situations and then declaring that the problems were but a guise for more favorable conditions, the child reconstructs reality so that he can cope with it.

The TAT themas of the third stage reflect a more acute awareness of societal demands coupled with attempts to modify behavioral aspects of inner feelings in order to meet these demands. The child seeks to win approval, rather than to be "right." Thus, social norms are not entirely integrated into the ego. Several boys expressed only positive feelings throughout their protocols, assiduously attempting to meet social expectations as they conceive them. To assist the child in meeting adult standards, many external controls, such as admonitions, prohibitions, punishments, etc., were introduced into the themas. The strain of the struggle for inner control is revealed in attitudes of resentment and in the recurrence of such elements as forgetfulness, unintentional mischief, and accidents among the stories in this stage.

By the time they attain the fourth level of ego development, the children manifest a considerable degree of inner control. They continue to strive for a harmonious balance between feelings and demands. The plot situations created were generally conducive to the achievement of the expressed motivations. In some instances the themas required that the wishes of the characters be modified or that their action plans be altered. When inappropriate drives appear to penetrate control barriers, the child expressed guilt, which operated to curb unacceptable behavior.

In endeavoring to meet environmental demands, the child in the fourth stage makes an attempt to understand them. Thus, many themas were concerned with adult problems, reasonings, and feelings. Concurrently, the children told stories expressing desires for independence. Running away tales were popular among the boys in the fourth level of ego development. Frequently the boys revealed their anxieties over the responsibilities of independence by recounting sad or unfortunate episodes in connection with running away.

Evidence relevant to an analysis of the categories, interpersonal relations and family dynamics, was also explored and evaluated. The children in the first stage pointed out single individuals rather than groupings of persons. Figures were identified impersonally, such as "someone," and their roles or functions were not mentioned. The absence of parental or other authority figures made it difficult to assess interpersonal relations from the limited material of the first stage.

In the second stage the child grouped the figures on the cards albeit without alluding to communication or interdependent functioning among the group members. Within the assemblages, individual will and activity predominate. In the TAT stories, as in the marble game, the child appears cognizant of the existence of groups, but there is little mutual participation among group members. Adult figures were viewed in terms of their relationships to children, such as "father." Unidimensional attitudes toward authority were expressed, however. Parents were considered to be entirely protective by some children or entirely restraining by others. In the third period the child perceives groupings of people engaged in common activities. He casts the figures into specific roles, but he does not project any understanding of their problems.

A wish for independence, replete with apprehensions, is apparent in the TAT responses of the third period. Many themas concerned money problems, which were considered as evidence of anxiety in connection with a desire for independence. Adult figures who thwarted the child are made to feel remorseful or guilty for their actions, or possibly sympathetic toward the child's plight. Attributing such feelings to authority figures may reveal the child's own reactions. On the other hand, many stories also contain expressions of the satisfactions which are derived from both helping the adult and receiving approval from him.

In the fourth stage expressions of joint giving and receiving as well as feelings of empathy among the characters in the stories are indicative of the quality of interpersonal relations. The stories reflect interest in the role and attendent functions of such figures as the doctor, the teacher, the parent, the friend. In plots where siblings were introduced, accompanying expressions of positive affect were noted. Concurrently with expressions of resentment and desires for independence, several of the themas also contained the beginnings of an understanding of the tasks, problems, and emotions of authority figures.

Group Comparisons

As discussed previously, several of the objectives of the study concerned group comparisons. Hypotheses were formulated to state the expected relationships among the variables which were considered in the research. Hypotheses 1, 2, and 3, which follow, pertain to the comparison of normal and mentally retarded children at four age levels[5] with respect to practice of rules and consciousness of rules.

1. Within the normal group and within the retarded group, the older children will tend to be at progressively more advanced stages than the younger children.

2. Mentally retarded children will go through the same sequence of stages as the normal children in both practice of rules and consciousness of rules. The retardates will lag behind the normal children, however.

3. For children who are at different levels of development in practice of rules and consciousness of rules, stages in practice of rules will be in advance of stages in consciousness of rules.

TABLE 1

SUMMARY OF THE ANALYSIS OF VARIANCE

Source	*df*	*p*
Grand total	191	
Uncorrelated portion	63	
Between age levels	3	.01
Between intell. groups	1	.01
Age-intell. groups interaction	3	*ns*
Within variation	56	
Correlated portion	128	
Between areas	2	*ns*
Areas-ages interaction	6	*ns*
Areas-intell. interaction	2	*ns*
Areas-ages-intell. interaction	6	*ns*
Within variation	112	

Hypotheses 4 and 5 pertain to a comparison of stages in ego development with stages in practice of rules and consciousness of rules.

[5] Age group A was composed of eight normal children who were chronologically 6 years of age, and eight mentally retarded children who were chronologically 8 years of age. Similarly, age group B was composed of eight normal children who were 8 years old and eight retardates who were 10 years old. The eight normal subjects in age group C were 10 years of age, and the eight retarded children were 12 years of age. In the oldest group, age D, were eight normal children 12 years of age and eight retardates 14 years of age.

4. There will be a significantly high positive correlation between levels of ego development and stages of maturity in practice of rules and in consciousness of rules.

5. The conclusions found with respect to practice of rules and conciousness of rules, for four age groups and two intelligence groups, will also be true with respect to ego development.

In an analysis of variance, summarized in Table 1, hypotheses 1, 2, 4, and 5 were verified, while hypothesis 3 was not substantiated.

Successive age groups were found to be progressively more advanced in stage of development in the three areas investigated. Thus, mental development with respect to social thought and behavior can be described as a progression of interrelated stages. Tables 2, 3, and 4 summarize the number of children who are classified in particular stages of development. The distribution of normal and mentally retarded children within the age groups studied is indicated in each of the three tables, respectively, for the areas of practice of rules, consciousness of rules, and ego development. In each of these tables the data appear to cluster roughly along a diagonal from upper left to bottom right. This line of progression reflects the classification of older age groups into relatively higher stages of development. The diagonal is particularly prominent in the frequency distribution of practice of rules, found in Table 2. No incidence of cases is here reported at age

TABLE 2

NUMBER OF CHILDREN IN SUCCESSIVE STAGES OF PRACTICE OF RULES

	Number of Children					
Group	*Stage I*	*Stage II*	*Stage III*	*Stage IV*	*Stage V*	*Total Cases*
Age A						
Normal	3	4	1	0	0	8
Retarded	6	1	1	0	0	8
Total	9	5	2	0	0	16
Age B						
Normal	1	1	6	0	0	8
Retarded	3	3	2	0	0	8
Total	4	4	8	0	0	16
Age C						
Normal	0	0	4	4	0	8
Retarded	1	1	3	2	1	8
Total	1	1	7	6	1	16
Age D						
Normal	0	0	3	4	1	8
Retarded	0	0	4	4	0	8
Total	0	0	7	8	1	16

TABLE 3

NUMBER OF CHILDREN IN SUCCESSIVE STAGES OF CONSCIOUSNESS OF RULES

	Number of Children				
Group	*Stage I*	*Stage II*	*Stage III*	*Stage IV*	*Total Cases*
Age A					
Normal	2	4	1	1	8
Retarded	2	5	1	0	8
Total	4	9	2	1	16
Age B					
Normal	1	1	4	2	8
Retarded	3	1	3	1	8
Total	4	2	7	3	16
Age C					
Normal	0	1	4	3	8
Retarded	1	2	2	3	8
Total	1	3	6	6	16
Age D					
Normal	0	0	3	5	8
Retarded	0	1	4	3	8
Total	0	1	7	8	16

level A, stages IV and V, at the one extreme, nor in age level D, stages I and II, at the other. The diagonal trend is also discernible in Tables 3 and 4.

Many similarities among the three areas appear in these frequency tables. For example, the retardates generally had a greater frequency of cases in the lower stages than did the normal group at the same age level, although occasional exceptions can be noted. An unusual case is illustrated by one age level C retardate in Table 2 who was considered to be more advanced than any normal subject in his age group. While the frequency data in each of the tables shows a clustering of the older age groups in successively higher stages of development, individual cases nonetheless were found to scatter over a large range. In Table 4, for example, the majority of the normal age level A subjects were found to be in stage I of ego development, but one child in the group was evaluated as in stage III.

Piaget explains the differences in mental process among individuals in terms of level of development rather than in terms of intelligence. The investigation of the normal and retarded subjects was approached from this point of view. The 32 normal and 32 mentally retarded children were found to progress through a similar sequence of developmental stages. However, a significantly large number of the children in the mentally retarded group were classified into lower stages of development than the normal children

TABLE 4

NUMBER OF CHILDREN IN SUCCESSIVE STAGES OF EGO DEVELOPMENT

	Number of Children				
Group	*Stage I*	*Stage II*	*Stage III*	*Stage IV*	*Total Cases*
Age A					
Normal	5	2	1	0	8
Retarded	5	3	0	0	8
Total	10	5	1	0	16
Age B					
Normal	1	1	4	2	8
Retarded	3	5	0	0	8
Total	4	6	4	2	16
Age C					
Normal	1	1	4	2	8
Retarded	2	4	2	0	8
Total	3	5	6	2	16
Age D					
Normal	0	2	4	2	8
Retarded	1	3	3	1	8
Total	1	5	7	3	16

of comparable mental age. Hence, even when the two groups were equated on a mental age basis, the retardates lagged behind the normal children by at least a stage.

To the extent that the present study is a replication of the marble game experiment conducted by Piaget and his fellow investigators in their studies of social behavior and thought, comparisons between the Swiss and American data can be made. The major conclusion to be stated in this connection is that the children in both studies progressed through a similar sequence of stages. While Piaget found that his subjects made advances in practice of rules before they progressed in consciousness of rules, the present writer found this to be true only for his older subjects. The younger boy, who was at a different level of development in practice of rules than in consciousness of rules, tended to be more advanced in the latter than in the former stage.

In the aggregate analysis the children were found to be in concomitant stages of progress in practice of rules, consciousness of rules, and ego development. The data for individual children appeared to be concentrated in median stages of development with overlapping of stages within an area manifested in varying degrees for different subjects. Although many children were classified into a more advanced stage of development in one area than in another, the statistical results indicate concomitant progress in the three areas for the groups as a whole. Pearson correlation coefficients de-

scribing the relationships among the areas are presented in Table 5. In the analysis of variance of the individual classifications, summarized above, it was also found that the between areas variation was not significant. Thus, the empirical study of game behavior and ego development demonstrates the implications of consistency between the theories of mental growth as advanced by Piaget and of ego development as posited by psychoanalytic psychology.

TABLE 5

RELATIONSHIP OF EGO DEVELOPMENT TO PRACTICE OF RULES AND TO CONSCIOUSNESS OF RULES

Areas Compared	*r*
Ego development and practice of rules:	
Normal	.64**
Retarded	.57**
All	.62**
Ego development and consciousness of rules:	
Normal	.55**
Retarded	.37*
All	.49**

* Significant beyond .05 level.
** Significant beyond .01 level.

SUMMARY AND DISCUSSION

To an important degree child behavior reflects genetic maturational factors. A major purpose of this study has been to delineate several behaviors which represent these developmental factors in children at several age levels. The two areas of investigation were ego maturation and socialization in normal and in educable mentally retarded children. Games of marbles were selected as the media through which a child's performance in social situations would be observed. In this way, levels of social maturation were identified and then compared with levels of ego development which were derived from analyses of TAT protocols. Generalizing from the data, in which it was found that the groups of children proceeded through concomitant stages in both areas studied, the following sets of characteristics can be said to be typical of child development:

Stage 1 (age 6—normal subjects; age 8—mentally retarded subjects)

1. The child acts upon his impulses, with apparently little or no prior deliberation.
2. Relationships among objects are determined by such elementary classification or organizing principles as proximity.
3. The child does not differentiate between what are rules (which regulate the behavior of interacting individuals) and what are habits (which he practices as an individual).

4. The child's game behavior consists of either repetitive motor actions or expressions of personal fantasy.

5. The child's game behavior is self-oriented, even when he is joined by others in play.

6. The child appraises situations in a personal, subjective way. There are wide variations among children in their descriptions of the same phenomenon.

Stage II (age 8—normal subjects; age 10—mentally retarded subjects)

1. The child tries to use the criteria utilized by adults for evaluation of events, but his successful adaptation of these criteria is hampered both by his limited facility to understand the nature of relationships and by his lack of experience.

2. The child does not perceive cause and effect operating in human relations. Hence, he views outcomes as fortuitous in nature and independent of purposeful action.

3. The child tends to express his feelings with minimal self-restraint. The desire for approbation and fear of reprobation constitute the forces which help the child gain control of some impulses.

4. The child accepts the proscriptions of authority figures as "desirable" while showing little understanding of the roles, functions, or feelings of these persons.

5. The child is eager to learn the necessary group rules, but he is neither completely cognizant of them nor thoroughly persuaded of their purposes and functions.

6. The child wishes to behave acceptably. However, he does not yet understand why certain behaviors are expected of him and hence he often acts as if unaware of external demands.

7. The child prefers games of short duration, although he may play for extended periods of time. With limited anxiety tolerance, he appears to enjoy a succession of short term goals.

8. The child is attached to many personal possessions and is unwilling to relinquish such objects to other children for the dubious rewards of group fun. For example, children at this age seldom play marbles for keeps.

Stage III (age 10—normal subjects; age 12—mentally retarded subjects)

1. The child often tries to modify some of his *feelings* in accordance with the demands of his school, family, social group, etc.

2. Curbs upon the child's behavior are still in large part foisted by the existence of external sanctions. Concomitantly, however, the child is developing a set of his own, individual, inner controls.

3. The child is beginning to recognize and understand, with considerable objectivity, many of the aspects of adult roles. He tries to incorporate the point of view of his "models" as a basis for forming his judgments.

4. The child respects those whom he considers to be in authority and looks beyond himself for guidance in solving his problems.

5. The child wants to and is able to master the details of the rules to games and to follow them correctly.

6. The child appears willing to work toward more distant goals. He is able to forego immediate satisfactions for the greater pleasures in meeting longer term objectives.

7. The child begins to seek the many values afforded by group association. He is willing to subvert some of his private inclinations in order to facilitate team activity.

Stage IV (age 12—normal subjects; age 14—mentally retarded subjects)

1. The child can articulate his feelings within the alternate modes society provides for their expression.
2. The child is in the process of developing a more mature inner control system through internal commitment to a hierarchy of values.
3. While the child recognizes the (often primary) importance of his own point of view, he tries to understand adult attitudes and opinions.
4. The child demonstrates a belief that, in general, calculated actions produce predictable outcomes.
5. The child is more able to understand reasons for rules in terms of the interrelationships among groups of people.
6. The child can view reality more objectively, and he is better able to grasp causal relationships.
7. The child is able to compromise some of his private desires in the interests of group functioning without submerging his individuality.

Personality appears to be a blend of these three components: predispositional temperament, an accumulation of emotional and cognitive experiences, and genetic maturity. Broadly identifying genetic trends in the development of groups of children enables one to recognize particular conditions (individual temperament or experiences) which determine a given child's performance, feelings, and attitudes. The schemas outlined above represent an attempt to isolate common elements in the patterns of development of children. However, the fusion of factors influencing ego structure at a particular time cannot be separated experimentally for our scrutiny. This fact poses methodological difficulties for empirical research. We are limited to such inferences as may be drawn on the basis of group study of those behaviors which appear in large part to be determined maturationally. The statement that the groupings outlined above are intended to be generally descriptive of successive phases of development must be qualified in terms of this underlying methodological base. Many individual variations were found to exist in overlapping of stage characteristics, in age, and in the complexity and individual qualities of the responses.

The findings of the present study have implications for parents, educators, and psychologists in their interactions with children. The patterns discussed provide a partial guide to our expectations of children's behavior at successive developmental stages. For example, the young child is largely dependent upon external strengths to aid in the control of many impulses. The adult is thus responsible for helping a child in his current wrestle with certain behavioral problems and, at the same time, for assisting him in the longer range development of an inner control system based on reasoning and understanding. Recognizing those impulses which dominate the behaviors in early childhood, the adult must tread between the boundaries of overburdening the child with demands on the one hand and of failing to provide sufficient controls for him on the other hand.

Only when educational objectives and methods are designed within the context of the sequence of development of the students can they be appropri-

ate and effective. As an illustration, the older child is more likely to be taught effectively when given group work experiences than is the younger boy or girl. The pattern of child development, in an oversimplified but perhaps useful statement, is one of dialectic upward vacillation from individualism through conformity and finally to a combination of social-yet-singular being. Thus, the teacher in the early elementary grades might select as her objective the sharing of equipment by children who are doing individual work. As boys and girls mature, they can evaluate and accept the points of view of others and hence are able to work with each other on projects whose scope requires cooperative group effort.

Two of the alternative, sometimes conflictual, drives discerned in the children participating in the study were the need for self-expression and the desire to conform. In attempting to direct and balance these forces, parents and educators face the problem of fostering originality in the child while teaching him to take advantage of a rich heritage of techniques and knowledge. On the basis of the descriptive outline of development, children learn skills very easily during the middle periods of development. During the earliest stage delineated above, the child expands upon his perceptual acuity and emotional containment until he is capable of blotter-like absorption in contact with his environment. To use, but not abuse, the child's middle stage propensities is the delicate problem faced by sensitive parents and teachers at this time. There are too few occasions when the adult must evaluate the influence of his actions upon the development of the child. It may often require self-restraint for the adult to encourage the child in independent probing, to acquire the technique of answering a question with another component question.

In some cases, a child's tendency to accommodate his behavior to the group expectations may direct itself to the standards of persons other than parent or teacher. Planning relationships with such children depends upon an investigation of the accompanying temperamental and experiential (family and sociocultural) factors. Regardless of the direction of the child's conformity, however, helping him to find reasons for beliefs or situations, difficult though this process sometimes can be, will offset the tendency toward obscuring of self during the third stage and promote the future internalization of desirable social values.

Finally, the present study illustrates that the mentally retarded child's social behavior and thought and ego development patterns are in agreement with the developmental schemas presented above. That is, *educable* retarded children, in the process of maturing, follow the same sequence of developmental stages as normal children. All of the children participating in the study lived in neighborhoods which were generally characterized as having a positive orientation toward the school objectives. In addition, the mentally retarded children were receiving special education in small classrooms to which behavior problem children were not admitted. Under these fortunate conditions the retarded children were not deflected, by general social influ-

ences at least, from functioning near their maximum potentials. In socialized behavior and in ego development these children lagged behind their normal counterparts in the regular classes, but nonetheless appeared to progress through all the stages we have described. These findings lead to hopeful prognostication for the social behavior and economic functioning of such children as adults. They also point to the possibility that the genetic maturation of these children *requires* accompanying experiences such as formed the educational and home environments of the participating subjects.

No single empirical study can do all things at once. To verify the cross-sectional description of genetic growth, a longitudinal study which follows the development of the same children over time is needed. In addition, a more comprehensive view of development would emerge were the researcher to investigate a child's thinking in several different areas at the same time. Since the purpose of the present study has been to delineate a simple, all-encompassing sequence of social development, scaling of individual variations was not undertaken. Consequently, an unanswered question which might well be asked is: Can we describe levels of intensity of development within each stage? Research on this problem might provide us with a further understanding of the nature of the retardation beyond its "lagging" aspects. There are, of course, many groups of mentally retarded children unlike those from whom the participants in this study were drawn. The findings of this study cannot be said to apply to these groups without additional investigation.

References

1. Erikson, E. H. Ego development and historical change. *Psychoanal. Stud. Child,* 1947, 2, 359-396.
2. Fenichel, O. *The psychoanalytic theory of the neuroses.* New York: Norton, 1945.
3. Freud, S. *The ego and the id.* London: Hogarth, 1927.
4. Hartmann, H. Ego psychology and the problem of adaptation. In D. Rapaport (Ed.), *Organization and pathology of thought.* New York: Columbia Univer. Press, 1951. Pp. 362-396.
5. Hartmann, H. The mutual influences in the development of ego and id. *Psychoanal. Stud. Child,* 1952, 7, 9-30.
6. Henry, W. *An analysis of fantasy.* New York: Wiley, 1956.
7. Inhelder, Bärbel. *Le diagnostic du raisonnement chez les débiles mentaux.* Neuchatel and Paris: Delachaux and Niestle, 1943.
8. Piaget, J. *The moral judgment of the child.* New York: Harcourt, Brace, 1932.
9. Piaget, J. *Play, dreams and imitation in childhood.* New York: Norton, 1951.
10. Sherif, M., & Cantril, H. *The psychology of ego involvements.* New York: Wiley, 1947.

DEVELOPMENT IN PRESCHOOL CHILDREN OF THE ABILITY TO COPY FORMS[1]

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The present paper reports changes with age in the ability of preschool children to make a paper and pencil copy of simple forms presented visually. The study was undertaken to provide knowledge of normal development of an ability which is of special significance in studying the brain-injured.

A major purpose of the present paper is to contrast two methods of conceptualizing developmental changes in form reproduction—one emphasizing continuity in development, the other hierarchic organization and discontinuity in development. From the continuity point of view, quantitative changes on single dimensions are studied. From the discontinuity point of view, the interest is in studying qualitative characteristics typical of particular developmental periods. In order to encompass both approaches, two methods of analyzing reproductions were used in the present study.

The first method was to judge the accuracy or correctness of the reproductions in terms of eight characteristics. From the continuity point of view, accuracy in reproducing each characteristic should be a monotonic increasing function of age. From the discontinuity point of view, there should be stages of development which would be reflected in differential rates of change of the characteristics with age. The characteristics judged were whether or not the drawing had some form, whether it reproduced the open-closedness and curvature-linearity of figures, whether there were the correct number of parts, whether there was the correct relationship of parts, whether orientation on the background was correct, whether size relation-

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ships of parts were correct, and whether the intersection of parts was correct. These particular categories do not, of course, exhaust the possibilities for analysis of differences between a drawing and an original. They were chosen either because of their historical interest or because it appeared likely that they would show a wide range of variation within the age group under investigation.

The second method of analysis was to judge whether reproductions were more "primitive" than the original designs. From the discontinuity point of view, "primitive organization" is characteristic of early stages of development, and three hypotheses stemming from this approach may be tested: Are primitive characteristics more frequent in younger children than in older? Are primitive characteristics more frequent than nonprimitive characteristics in young children? Do primitive and nonprimitive characteristics change differentially with age?

Primitive organization was judged by rating three characteristics—whether the reproduction was more closed than the original, simpler, or more symmetrical. The logical opposites of these, opening figures, complicating them, and making them less symmetrical, were also judged and were considered to be evidence of nonprimitive organization. The characteristics of primitive organization, as these are revealed in children's copies of geometric figures, have been most explicitly and clearly described by Werner (5, p. 122):

1. The strong emphasis on qualities-of-the-whole:
   a. Making a figure more uniform, indivisible:
   b. Closing an open figure:
2. In the homogeneization of directions and parts by:
   a. Making parts alike:
   b. Simplifying directions:
   c. Using symmetry:

The description of these characteristics is in terms which should make it possible for an observer to identify the presence or absence of the characteristics. They overlap to some extent, however, and seem reducible to the three characteristics mentioned above. To these clearly defined characteristics, Werner adds another which he calls the "chain type" of reproduction. This is described as "the concatenation of pieces of the whole, an arrangement in which the distinguishing marks of higher geometric forms—the subordination of single parts, the presence of centers, and so on—are lacking. . . . The distinguishing sign of the chain type of drawing is the relative lack of definiteness in the relation of the parts" (5, p. 123-124).

We found it difficult to specify the distinguishing characteristics of this type of reproduction. A "relative lack of definiteness in the relation of parts" could be applied to any figure which did not accurately reproduce the origi-

nal. It also might be interpreted as a figure in which the parts were more separated or spread out than the original rather than simplified and closed, or in which the figure was less uniform rather than more uniform than the original and so on. If either of these interpretations were employed, the theory of a primitive kind of organization would reduce to the statement that there are accurate reproductions and inaccurate reproductions and that inaccurate reproductions may be more or less uniform, more or less closed, or more or less symmetrical than the originals.

Method

Subjects

The subjects of the main experiment were 108 children, 18 in each of six age groups, proceeding by half-year steps from two and a half years to five years. In each half-year age group, there were nine boys and nine girls, of whom three of each sex were Negro and six were white. Half of the white children were under private medical care and half were under clinic care. Children were not included in the study if they were known to have behavior problems or if there was any history of neurological disease, convulsions, head injuries, or other evidence suggesting injury to the brain. All were products of single, full term births which had occurred without complications or operative intervention. Intelligence, as judged by a vocabulary scale, ranged from IQ 75 to IQ 173 with a mean of 119.4 and standard deviation of 23.3. Mean IQ estimated from this vocabulary scale was seven IQ points higher than the mean Binet IQ among a separate group of three-year-old children to whom both tests were administered. Mean and variance of the vocabulary scores did not differ significantly among the six age groups.

An additional 20 *Ss* were studied in a second experiment, differing from the main experiment only in the order of presentation of stimuli. The criteria for inclusion were the same as in the main experiment. No effort was made to specify age, sex, and race distribution, but all groups were represented. Subjects were obtained through the cooperation of medical facilities, individual physicians, and nursery schools.[2]

Stimuli

Stimuli consisted of the 18 forms reproduced in Figure 1. They were drawn in India ink on 5×8 inch white cards, with one design to a card. There were three curvilinear drawings. The remainder were line drawings

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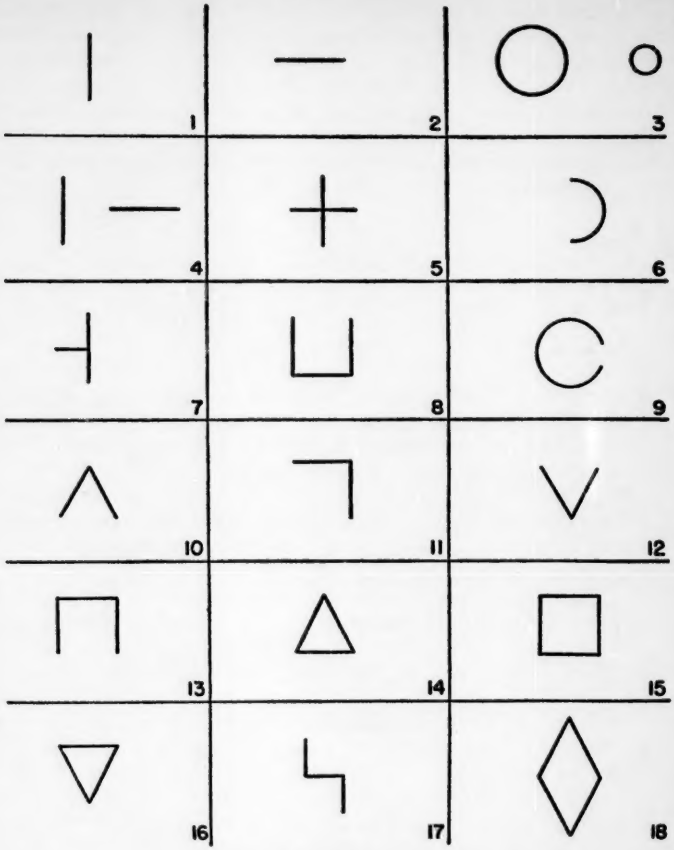

FIGURE 1—Stimuli.

varying primarily in the number of lines employed, the point at which the lines intersected, the size of the angle formed by their intersection, and their orientation on the background. The four "primary" figures—circle, triangle, square, and diamond—were included, and various combinations of parts of them were presented as separate figures. The number of each form indicates the order of presentation used in the main experiment. This order was roughly in terms of difficulty, estimated after preliminary work, except that identical designs, differing only in orientation on the card, were never presented in succession. Because of the age range of our sample, it was

desirable to present material in an increasing order of difficulty so that the youngest would not lose interest in the task before they had an opportunity to demonstrate the limits of their ability.

A different order of presentation was used in the second experiment, which was designed to estimate the effect of order. In this experiment the order (18, 2, 17, 1, 16, 3, 15, 5, 14, 4, 13, 9, 12, 6, 11, 7, 10, 8) was such that designs occurring near the end of the main experiment occurred near the beginning in the second experiment, but were alternated with easier figures. The interspersion of easy designs was again necessary to maintain the interest of the youngest *S*s. The order of designs which were duplicates, except for their position, was reversed.

Procedure

Each subject was tested individually, the copying of forms procedure being inserted in a test session which lasted about an hour. The point at which the procedure was introduced was varied at the discretion of the examiner so as best to maintain the child's cooperation throughout. At the same time that the first stimulus card was exposed, the *S* was given a pad of five by eight paper and told, "See this? You make one just like it. Make yours right here." All 18 stimuli were presented except when three successive drawings had been made which were too poor to receive a form rating or when there had been three successive repetitions of the immediately preceding form. If a child embellished a drawing after having completed it or engaged in irrelevant drawing play, the examiner indicated this on the protocol. Such productions were not considered in analyzing the data. Spontaneous repetitions of a drawing were permitted, and in these cases the best reproduction was used in the analysis.

Measures of Primitive and Nonprimitive Organization

For each design a rating was made of whether the reproduction was more closed or more open than the original, more complicated or more simplified, more symmetrical or less symmetrical. Only instances in which the change was clearly evident and unequivocal were so rated. When there was any doubt as to the presence of a change, or if the change appeared to involve both of the opposed characteristics—as where one portion of the figure was more closed and another portion was more open—"no change" was recorded. Markings which did not represent an attempted reproduction, scribblings or perseverations without reference to the original design, were not included in this analysis (see "no-form" rating below). Allowance was made for lack of motor skill, especially in judging symmetry. If strict adherence to quantitative measurement were followed in comparing symmetry of an original and a copy, very few drawings would show increased symmetry. A drawing was judged to be more symmetrical when the reproduction resembled a form which would be more symmetrical than the original if it had been executed skillfully.

The reliability of the judgments was determined on a sample of 50 cases distributed among all subgroups of *Ss*. Correlations of two judges independently rating this sample ranged from .81 for more openness to .88 for more closure. These are satisfactorily high, especially since no period of training or practice was given prior to making the ratings. There was a significant difference, as well as a high intercorrelation, between the judges in rating decreased symmetry. The ratings used in the analysis were based on the judge who observed decreased symmetry less often.

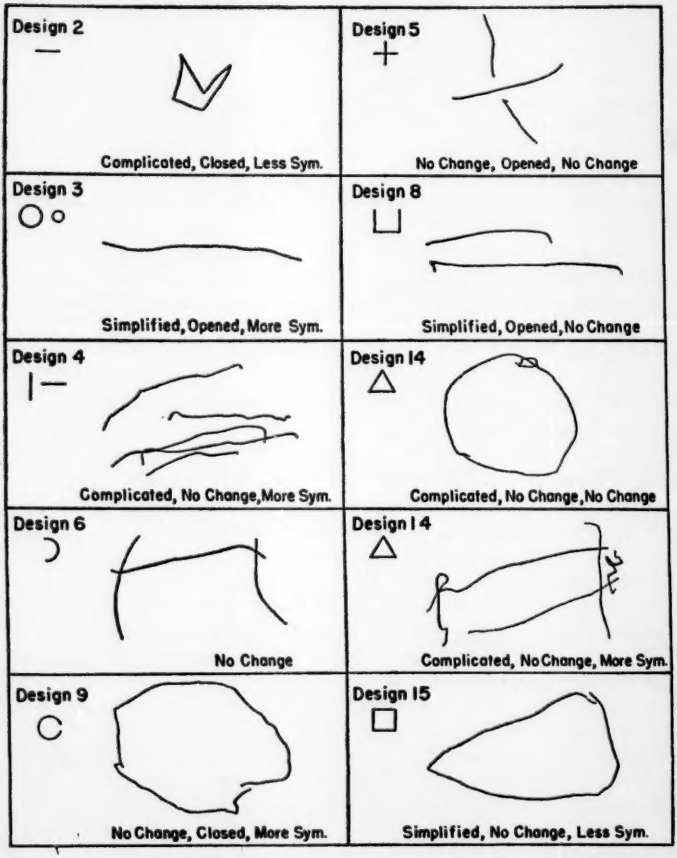

FIGURE 2—Illustrative reproductions.

Ten reproductions made by subjects in the three and three and one-half year groups are shown in Figure 2. The reproductions were selected to illustrate the ratings and to show as wide a variety as possible. Each drawing was made by a different child except for the reproductions of designs 6 and 9. These were included to indicate the difference in approach which can characterize the reproductions of a single subject.

Measures of Accuracy

Ratings of the presence or absence of the eight accuracy characteristics were made for each reproduction. If a reproduction did not possess any form, it automatically could not be correct in any of the other characteristics. The other characteristics were therefore rated, not as incorrect, but as unscorable. This policy was followed whenever a characteristic was incorrect because of failure to reproduce some other characteristic. It was not possible to judge the correctness of orientation, for example, unless enough of the general configuration had been reproduced to make the figure recognizable. Those features necessary to make a judgment depended upon the characteristics being judged and the particular figure, but for each figure and each characteristic these could be specified.

Detailed instructions, including illustrative samples, were prepared in order to make the judgment sufficiently objective. An abbreviated description of these is given below. The instructions were completed before the beginning of the experiment on the basis of a preliminary sample of drawings, and only minor clarifications of them were made subsequently. The general orientation underlying them was that all drawings called correct in a particular respect should appear equally similar or dissimilar to the sample from which the *S* had made the copy.

Correlations of two judges independently rating the sample of 50 cases ranged from .92 for intersections to .99 for orientation and for organization. The judges had had prior experience in rating a preliminary sample.

Abbreviated descriptions of the criteria used in rating follow.

Form. Form was scored for a reproduction which was more than a scribble, whether or not it resembled the sample. If *S* made four successive repetitions of the same form and there was no evidence, through eye movements or other behavior, that he was attempting to copy the sample, testing was terminated. The first of the repetitions was considered to have form, but the following three were considered perseverations and were rated as not having form.

Open-closed. The 18 stimuli can be divided into three groups: open, closed, or semiclosed figures. If the general configuration of the reproduced figure would be classified in the same group, credit was given for this characteristic. An open or semiclosed figure might be reproduced as more closed than the original and still be classified as an open figure. Similarly, a closed figure might be reproduced by drawing lines which did not actually join but whose general configuration would still be that of a closed figure.

The intent, in rating this characteristic, was to judge whether the gross gestalt of openness or closedness had been reproduced and not, as in the rating described earlier, to classify the direction of any perceptible change. A single closed figure, as a reproduction of the two circles, was given credit.

Curved-linear. A linear figure was judged as correctly reproduced when the reproduction was composed predominantly of lines even though there might be some curvature in parts of the figure or rounding of the angles. Similarly, portions of the circles and partial circles might be reproduced by straight lines, but as long as the reproduction was composed predominantly of curved lines it was considered correct.

Number of parts. Credit was given for a reproduction having the same number of parts as the original, without regard to the arrangement of the parts. A part was defined as either a change in direction or a discontinuity. Both designs 5 and 11 are two-part figures by this definition. It is not possible to specify the number of parts of a curved figure in any such rational manner. The arbitrary decision was made that design 3, the two circles, consisted of two single-part figures and that designs 6 and 9, the partial circles, consisted of from one to three parts. In counting the number of parts in a reproduction, the same criteria were followed. A circle was considered to be a single part and was therefore *not* credited as a reproduction of the number of parts of a triangle or a square. It was given credit as a reproduction of either of the single lines (designs 1 and 2) or of the partial circles (designs 6 and 9). Subjects sometimes drew curved lines or arcs in reproducing linear figures. These were arbitrarily rated in the same way as the original designs 6 and 9; that is, they were judged to consist of from one to three parts. In deciding whether such an arc was a correct reproduction of the number of parts of the original, the decision was always made in favor of crediting the subject, if this was possible. Thus, both) and) were accepted as reproductions of a figure with two parts.

Organization. Credit was given for a reproduction in which the parts preserved the same spatial relationship to one another as was true in the original although they might be incorrect with reference to their absolute placement on the background. For eight of the figures—the two lines, the two partial circles, and the four closed figures—this criterion was automatically satisfied when the four characteristics defining the general gestalt were correctly reproduced, that is, form, open-closed, curved-linear, and number of parts. In the remaining figures most of these characteristics had to be correct before organization could be judged, but they did not completely determine the rating. A definitely circular form was required on design 3. Concentric circles or embellishments were not credited, nor was markedly elliptical shape. It was not necessary to have two circular forms, however. For designs 4 and 7 to be correct, the two parts had to be roughly perpendicular. They might join, but not cross, at any point except their ends. On design 5 the two parts had to be crossed. On designs 8, 10, 11, 12, and 13 the parts had to be joined at their ends, if formed by lines. If

formed by curves, these had to be broadened at the base for designs 8 and 13 and narrowed at the base for the other three figures. For design 17 the changes in direction of the three parts had to be in the same quadrant as the original.

Orientation. This rating was based on the relationship of the figure to the ground. The relationships of parts of the figure to one another did not have to be correct as long as the general configuration could be recognized. Reproductions were rated as correct, reversed (a rotation of 90 or 180 degrees), or tilted (a rotation of 30 to 45 degrees).

Size. Credit was given for reproducing the correct size relationship of parts, not the correct absolute size. For this characteristic to be judged, the organization of the parts had also to be correct. Different absolute standards of accuracy were required for the different figures in order to give perceptions of equality. With open figures, reproductions of equal lines appeared roughly correct if the difference between them was less than one-half the length of the shorter line. With closed figures, however, equal lines appeared equal only if the difference between them did not exceed one-third the length of the shortest side. In the case of designs 8 and 13 a difference in the sides of these figures which exceeded one-fifth the length of the shorter side destroyed the appearance of equality. Reproductions of bisections were called correct when a line was intersected at any point along the middle one-half of its length. Reproduction of the two circles was considered correct when one was clearly larger than the other. If there was uncertainty in making the judgment, credit was not given.

Intersections. This characteristic was rated as correct when angles of figures were roughly accurate in size. An error of 17 per cent was permitted, that is, $\pm 10°$ for 60° angles and $\pm 15°$ for 90° angles. They could be formed by the intersection of two lines if these did not overlap by more than two mm. or were not separated by a space of more than one mm. They could not be rounded or dog-eared. The number of angles did not need to be correct but the majority of them should meet the criteria for this rating. For design 4 the two lines should *not* be joined.

Results

Primitive and Nonprimitive Organization

The total frequency of each of the primitive and nonprimitive characteristics and the percentage of attempted reproductions showing these characteristics are arranged in Table 1 by age groups. Frequencies have been included in the table only to show the size of the *N* on which the percentages are based. It is not possible to interpret meaningfully the change in frequencies with age since, unlike percentages, they are not independent of the increase with age in the number of attempted reproductions. In judging primitive and nonprimitive organization, an attempted reproduction was one which was more than a scribble or a perseveration. The results

TABLE 1

NUMBER OF REPRODUCTIONS OF 18 DESIGNS SHOWING PRIMITIVE AND NONPRIMITIVE CHARACTERISTICS AND PERCENTAGE OF ATTEMPTED REPRODUCTIONS SHOWING THESE CHARACTERISTICS

	AGE GROUPS ($N = 18$ in each group)									
	2½	3		3½		4		4½		5	
Characteristics	*No.*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Nonprimitive (Complicated) .	6	49	29	51	27	44	15	44	14	30	9
Primitive (Simplified)	1	37	21	36	17	54	18	33	11	24	8
Nonprimitive (Opened)	1	46	28	33	15	33	11	39	12	20	6
Primitive (Closed)	3	31	18	29	14	49	16	22	7	7	2
Nonprimitive (Less Symmetry)	2	57	33	48	25	81	27	71	22	51	16
Primitive (More Symmetry) ..	0	23	14	44	21	30	10	16	5	13	4

of the two and one-half year group will be omitted in handing the data since the *N* on which they are based is too low to provide a reliable estimate. The main value of including the group is to show that the ability to reproduce forms is being measured near its zero point.

The group figures shown in Table 1 may be examined in the light of the three hypotheses to be tested. The first hypothesis, that primitive characteristics are more frequent in the drawings of younger children than in those of older children, would probably be confirmed. However, the second hypothesis, that primitive organizations are more frequent than the opposite or nonprimitive organizations, is disproved on the basis of these group percentages. Results indicate that they are, if anything, less frequent. The answer to the third hypothesis, that there is a differential change with age in primitive and nonprimitive characteristics, is not clear from inspection of the table.

Before testing these hypotheses statistically, it is necessary to consider whether, with the 18 designs used, there is equal opportunity for primitive and nonprimitive characteristics to occur. While any figure might be changed through primitivation of the original pattern, primitivation is expressed in various ways and not all of these ways would be possible with every figure. A square, for example, can not be made more closed, although it could be simplified by making it circular. A straight line, on the other hand, could not be made more open although it could be made more complicated. In comparing symmetry and simplification, therefore, the two straight lines (designs 1 and 2) should not be included since the possibility of obtaining a primitivation characteristic is not as good, a priori, as the possibility of obtaining nonprimitivation. For the same reason, only the 11 semiclosed designs should be included in comparing opening-closure tendencies.

The number of reproductions of these designs on which a subject showed a particular primitive (or nonprimitive) characteristic was expressed as a percentage of the total number of his attempted reproductions of these same designs. An angular transformation of the percentages was made, and the mean transformed percentages are shown in Figure 3 for each age

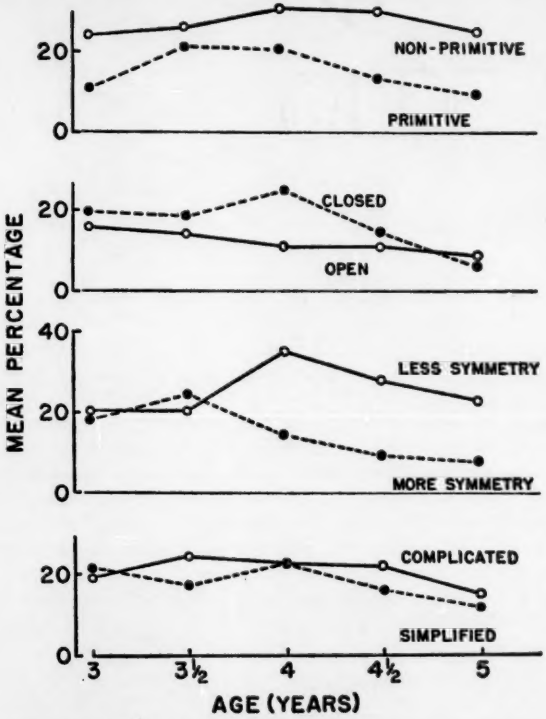

FIGURE 3—Mean transformed percentages of reproductions showing various primitive characteristics or the opposite characteristics.

group and for each pair of characteristics. Figure 3 also shows the mean transformed percentage of reproductions which showed *only* primitivation characteristics or *only* nonprimitivation characteristics. An example of a reproduction in which the change is one of primitivation is design 9, in Figure 2. Design 5, in the same figure, illustrates a change which is nonprimitive. With one exception, the remaining reproductions in Figure 2 possessed both primitive and nonprimitive characteristics.

TABLE 2

ANALYSES OF VARIANCE OF AGE CHANGES IN THE TRANSFORMED PERCENTAGE OF PRIMITIVE AND NONPRIMITIVE CHARACTERISTICS

		MEAN SQUARE			
Source	*df*	*Simplified vs. Complicated*	*Closed vs. Opened*	*More vs. Less Symmetry*	*Primitive vs. Nonprimitive*
Ages (A)	4	432.29	764.17	455.04	491.62
linear	1	1109.93*	2402.81*	456.88	170.29
quadratic	1	539.73	488.84	1141.21*	1662.25**
cubic	1	59.71	38.34	68.79	124.14
fourth degree ...	1	19.81	126.71	153.25	9.80
Ss within ages	85	277.18	353.88	231.26	200.64
Characteristics (C) ..	1	129.64	1007.16	4710.00**	5419.07**
A × C	4	90.27	330.03	1167.64**	224.63
Pooled *Ss* × C	85	281.82	323.62	280.92	176.86

* $p < .05$.
** $p < .01$.

Table 2 shows the results of the four analyses of variance comparing the pairs of primitive and nonprimitive characteristics. The main purpose of statistical analysis was to determine whether there is an interaction between the kind of characteristic (primitive or nonprimitive) and age—specifically, whether there is a differential change with age such that primitive characteristics are relatively more frequent at the youngest ages and relatively less frequent at older. The only comparison showing such an interaction was the increase or decrease in symmetry of a reproduction. The closed-opened and simplified-complicated characteristics show a significant linear decrease with age but there is no differential change. Analysis also reveals that the percentage of reproductions showing only nonprimitive characteristics is significantly higher than the percentage showing only primitive characteristics. This is presumably due to the frequency with which a reproduction is produced as less symmetrical. Although the graph of only primitive and only nonprimitive characteristics suggests that primitive organizations may rise to a peak at the youngest ages and then decline, the interaction is not statistically significant.

Accuracy

Table 3 shows the total frequency of the eight accuracy characteristics in each age group. The characteristics have been listed in the order of decreasing frequency, and it will be observed that this order is the same at each age. There are more correct reproductions of general characteristics

TABLE 3

MEAN NUMBER OF REPRODUCTIONS JUDGED CORRECT ON EIGHT ACCURACY CHARACTERISTICS

(Each *S* reproduced 18 designs.)

	AGE GROUP ($N = 18$ in each group)					
Accuracy Characteristic	2½	3	3½	4	4½	5
Form	0.7	9.7	11.9	16.8	17.9	17.7
Open-closed	0.6	7.4	9.7	14.9	16.2	17.0
Curved-linear	0.4	7.0	9.6	12.8	13.9	16.0
Number of parts	0.3	4.9	6.7	10.7	13.8	14.8
Organization	0.3	3.7	6.0	9.4	12.0	14.4
Orientation	0.2	2.6	4.8	7.6	9.2	12.3
Size	0	1.4	2.7	4.8	6.9	8.8
Intersection	0	0.6	1.7	2.7	5.5	7.1

determining the "whole-quality" (form, openness or closedness, curvilinearity or linearity, and number of parts) than of correct reproductions of details of design. This does not mean that general characteristics are easier to reproduce than details, however. Such a conclusion would overlook the fact that the characteristics are not independent of one another, as mentioned earlier. If a reproduction does not even possess form, it automatically could not be correct in any of the other characteristics. Similarly, it was found that on eight of the figures the organization or relationship of parts was automatically judged correct when the four characteristics defining the general gestalt were correctly reproduced and, conversely, that it was not possible to make a judgment of the relationship of parts unless most of these general characteristics were correct.

The frequencies of the individual accuracy characteristics were therefore expressed as a percentage of the number of designs which could be independently scored for that characteristic. The frequency of number of parts, curved-linear and open-closed characteristics were expressed as a percentage of the number of designs which had form, since these characteristics could be judged independently of one another. The frequency of correct organization and of correct orientation was expressed as the percentage of the number of designs which had form and two or three of the characteristics defining the general gestalt. The particular characteristics required for a particular design were not necessarily the same from design to design or for both organization and orientation but were specified in each case. The same procedure was followed in specifying the characteristics a reproduction must possess before the handling of its size relationships and intersections could be judged. In general, the organization (relationship of parts) needed to be reasonably accurate in order to make either of these judgments. The

TABLE 4

MEAN TRANSFORMED PERCENTAGES OF INDEPENDENTLY SCORABLE REPRODUCTIONS JUDGED CORRECT ON EIGHT ACCURACY CHARACTERISTICS

Accuracy Characteristic	AGE GROUP ($N = 18$ in each group)				
	3	3½	4	4½	5
Form	51	61	83	88	88
Organization	53	69	76	78	86
Open-closed	50	62	75	77	84
Curved-linear	54	61	65	66	77
Number of parts	36	44	55	62	71
Orientation	41	41	57	60	67
Size	36	29	49	52	53
Intersection	8	16	25	35	39

mean transformed (arc sine) percentages of correct reproductions are shown for each characteristic in Table 4. They provide an index of the change in a characteristic freed from the effect of change in other characteristics on which it is dependent. The two and one-half year group is not included because of the small number of attempted reproductions. The percentage of reproductions with form is, of course, a percentage of the 18 designs presented. It should be noted that the transformed percentages in this table, and in Figure 3, are the means of the transformed percentages obtained for each *S* separately. They can not be calculated directly from the group percentages of Tables 1 and 3.

As in Table 3, the eight accuracy characteristics increase from age to age, with one reversal. The relative order of difficulty, however, is quite different and changes, to some extent, from age to age. Organization, instead of appearing to be more difficult than reproduction of the general characteristics, appears to be quite easy. That is, if reproductions have enough of the general configuration present so that it is possible to judge of the correctness or incorrectness of the relation of the parts to one another, the majority are correctly related. In contrast, reproducing the correct number of parts or the correct orientation of the figure appears to be relatively difficult at all ages. The difficulty of reproducing the correct number of parts is especially interesting because this characteristic, to a considerable extent, determines whether or not the general gestalt is preserved. The most difficult characteristics to reproduce are the "details"—size relationships and intersections.

An analysis of variance of these data is shown in Table 5. The change with age is significant as is the difference among the characteristics. There is, however, no interaction with age. Although some characteristics may be easier than others to reproduce, there is no evidence to suggest a sudden

TABLE 5

ANALYSIS OF VARIANCE OF AGE CHANGES IN THE PERCENTAGES OF INDEPENDENTLY SCORABLE REPRODUCTIONS JUDGED CORRECT ON EIGHT ACCURACY CHARACTERISTICS

Source	*df*	*Mean Square*	*F*
Ages (A)	4	21,567.5	13.14*
Ss within ages	85	1,641.5	
Characteristics (C)	7	25,576.0	91.91**
A × C	28	315.9	1.14
Pooled *Ss* × C	595	278.3	

* $p < .05$.
** $p < .01$.

emergence, gaps, or uneven development within the age range examined and within the definition of the characteristics employed.

Table 6 shows the results of a similar analysis by designs rather than by characteristics. A subject's total "score" on each design was computed by assigning one point for a correct reproduction of each of the six accuracy characteristics which could be judged on all designs. The detail characteristics (size and intersection) were not included in computing this score since size relationships could not be judged on the two single-line figures and intersections did not occur on five of the figures. Once again the two main variables differ significantly but there is no interaction. The general trend of increasingly accurate reproductions with increasing age must be assumed to be the same, within the limits of normal variability, for each of the designs.

The significant difference among the designs is of some interest. Apparently, although they all show a similar pattern of increasingly correct reproductions with age, at any one age the designs differ among themselves in

TABLE 6

ANALYSIS OF VARIANCE OF AGE CHANGE IN TOTAL SCORES ON EIGHTEEN DESIGNS

Source	*df*	*Mean Square*	*F*
Age (A)	4	567.09	18.02**
Ss within ages	85	31.47	
Designs (D)	17	75.83	55.35**
D × A	68	2.45	1.79
Pooled *Ss* × D	1445	1.37	

** $p < .01$.

the extent to which they are correctly reproduced. It might appear self-evident that this is because some designs are harder than others, but since there is no independent criterion of difficulty, such a statement would be redundant. We may, however, define difficulty in terms of the correctness of reproduction and then examine the difficulty or correctness order of the designs to determine what aspects of the designs are related to this order.

TABLE 7

RELATIVE DIFFICULTY OF 18 DESIGNS AS SHOWN BY MEAN SCORES ON SIX ACCURACY CHARACTERISTICS UNDER TWO PRESENTATION ORDERS AND BY SCALE VALUES BASED ON THE COMBINED WEIGHTED SCORES

	Original Order		Changed Order		
Design	*Presentation*	*Mean Score*	*Presentation*	*Mean Score*	*Scale Value*
	1	4.68	4	4.75	1
	2	4.19	2	4.65	3.7
	3	3.92	6	4.20	5.7
	4	3.81	10	3.85	6.6
	5	3.69	8	4.50	6.6
	7	3.54	14	4.05	7.9
	9	3.30	18	4.05	9.2
	6	3.41	16	3.35	9.3
	11	3.15	12	3.65	10.4
	8	3.14	17	3.30	10.8
	13	2.85	13	3.40	12.3
	10	2.81	15	3.15	12.8
	15	2.43	9	3.35	14.7
	17	2.33	7	3.60	14.9
	12	2.44	11	2.65	15.3
	14	2.16	5	2.95	16.5
	16	1.98	3	2.70	17.7
	18	1.81	1	3.35	18.0

The mean "score" on the six characteristics is shown for each design in the left-hand column of Table 7, and the order of these means may be said to define the relative difficulty of the designs. These mean scores are based on the total sample, but the relative difficulty of the designs is highly similar in the individual age groups. The means for each design in each of the age subsamples were correlated with the means for each design in the total sample. The correlations ranged from .91 to .96 for the five older age groups. The correlation was only .62 in the two and one-half year olds due

to the large number of zero scores at this age. This is essentially a test-subtest measure of reliability of the difficulty order. A similar indication of reliability of the difficulty order is shown by correlations ranging from .88 for form to .97 for organization when the number of correct reproductions of each design on all six accuracy characteristics was correlated with the number of correct reproductions of each design for each of the accuracy characteristics separately. These correlations were calculated for the total sample.

It will be noticed that the relative difficulty of the designs is very similar to the order in which they were presented. The correlation of presentation order and mean accuracy score was —.97. This is not surprising since the presentation order was intended to approximate roughly the anticipated difficulty order. However, before inferring any relationships between characteristics of the designs and their difficulty, it is necessary to estimate separately what effect presentation order has on difficulty. The second experiment, using a changed presentation order with 20 *S*s, was carried out for this purpose. The mean scores on each design with the changed order of presentation are also shown in Table 7. The correlation of presentation order and mean accuracy score in this case is only —.16, which does not indicate any significant relationship between presentation order and difficulty order, while the correlation between the two sets of mean accuracy scores under the two orders of presentation is .85, a correlation nearly as high as the test-subtest measures of reliability. The present evidence suggests that order does not contribute a major portion of the variance. However, there are a considerably larger number of variations in presentation order possible, and it would be surprising if this factor could not be shown to have an effect on difficulty which was significant, if minor.

The designs in Table 7 are listed in the rank order determined by the combined scores of both presentation orders, weighted according to the *N* in each sample. For convenience, these combined accuracy scores were converted to a scale on which the easiest design is assigned a scale value of 1.0 and the most difficult design a scale value of 18.0, as shown in the table.

What are the features of the designs themselves which appear to be associated with greater difficulty in reproducing them? The most obvious is the number of parts, defined as either a discontinuity or a change in direction. But there are two exceptions to this: the two acute angles are more difficult than the three-part figures, and the two triangles are more difficult than the square. It seems probable that the sharpness of the turn or change in direction is itself a factor contributing to difficulty. It is possible to reproduce any of the angles by joining two lines, and this method is, in fact, used by a number of *S*s, not only to reproduce the single angles but also to reproduce the three- and four-part figures. The most common method, however, is to attempt to reproduce them with a continuous line which changes direction, and this method often leads indirectly to considerable distortion of the figure. This may explain why the three two-part

figures in which the two parts are discontinuous appear to be easier than the right angle. As far as can be judged, without a more systematic investigation than the present experiment provides, right-left or up-down orientation of the figure does not affect its difficulty. There are no consistent trends when figures differing only in orientation are compared. The differences that do obtain between them are probably due to unreliability in part and in part to the absolute and relative order of presentation.

Discussion

Previous studies of form reproduction by children have been largely stimulated by interest in Gestalt principles of perceptual organization. Werner has made the clearest statement of developmental changes which would be predicted on the basis of these principles. In addition to formulating a general developmental "law," he has stated that these principles applied to motor as well as perceptual behavior (5, p. 121) and has described explicitly the characteristics to be expected in children's drawings (5, p. 118 ff.). The present study attempted to determine whether the characteristics were present in reproductions which children between the ages of two and one-half and five made of 18 designs. Most of the descriptions stemming from the principle were not confirmed. Simplification and closure were more common in the reproductions of younger children than of older, but they were no more frequent than the opposite characteristics of complicating and opening reproductions. Both pairs of characteristics declined with age, but the decline was not differential. Increasing the symmetry of a reproduction was more common than decreasing the symmetry only in the three and one-half year group. The interaction with age was, however, significant and is in line with Werner's theoretical expectation.

It seems necessary to conclude that the explicit descriptive principles expounded by Werner are not an adequate means of conceptualizing development of children's ability to reproduce figures. Efforts were made to apply the descriptive principles objectively and reliably and with considerable allowance being made in favor of the theory. The results were largely negative. We have included a number of specific illustrations of drawing which we have judged to contradict the Gestalt formulation (*see* Figure 2). Any broadening of the Gestalt principles so as to encompass these negative instances would seem logically to require either or both (a) considering the accuracy of the drawing or (b) stating that the drawings of young children are either one thing or the opposite. That is, if the description is made sufficiently broad, there would be no conceivable drawing which would not be covered and the only distinction possible between the drawings of younger and older children would be in terms of the accuracy with which the original is reproduced.

It is precisely this method that we would suggest as the most meaningful way to organize the developmental data. Children's reproductions show

increasing accuracy or veridicality with age. Of this, Werner has said, "an analysis of types of operations rather than measurement merely in terms of accuracy of performance often reveal the truer developmental picture" (6, p. 132). We are suggesting the reverse, that rises and falls in "types of operations" represent indirect consequences of the gradual improvement in accuracy of performance. The interpretation that three-year-olds close a partial circle because they are at a stage of development where there is a closure tendency is belied by the fact that opening the partial circle occurs just as frequently in three-year-olds. An interpretation which does accord with the facts is that in the course of learning to reproduce distances they err in both directions—they both under- and over-estimate.

Stating that increasing accuracy is the most satisfactory general concept to describe the developmental course does not imply that accuracy improves in every respect with every design. We found, in fact, that changes in the method of reproducing one aspect, as an angle, often resulted indirectly in less accuracy in reproducing some other aspect of that figure, as its general gestalt. The principle does imply that, over time and with an adequate sample of the population of figures, reproductions will increasingly approach the original in all dimensions. There may be differences with age in which dimensions are learned earliest or reach some comparable level. Piaget suggested that "open-closed" is learned before number of sides and angles (4). Our data are in agreement with this. But our data indicate that the child does not go through discrete stages of learning to perceive size or to make intersections or to make straight lines or to learn the number of parts. Rather, there is gradual improvement in each of these as a function of age and as a function of the specific stimulus and its difficulty.

The stimulus is probably as significant a variable in determining the reproduction as is age. What aspects of the stimulus are associated with its difficulty requires further systematic investigation. As studies by Harlow (3), Attneave and Arnoult (2), and others have demonstrated, characteristics which have been considered in qualitative terms can be profitably quantified. In the present investigation the aim was to select from the designs which could be reproduced by this age group a sample varying along as many dimensions as possible. We found that the order of difficulty of the 18 designs used was highly consistent in each of our preschool age groups and for the various characteristics of the reproduction that were judged. From this consistent order inferences could be drawn as to aspects of the designs which were related to difficulty. However, such inferences need confirmation and more precise definitions of the relevant dimensions.

From our results we inferred that the number of parts is an important dimension determining difficulty. This variable is similar to Attneave's Number of Turns dimension which he found accounted for nearly four-fifths of the variance in judgments of the complexity of shape (1). Both discontinuities, included in defining parts, and the acuteness of the change from one direction to another also appear to determine difficulty. These are

variables whose effect may be more important for motor than for perceptual behavior. The orientation of a design did not appear to be important in the present study but the right-left, up-down changes in orientation which were employed maintained a parallel relationship of figure to ground. A change from parallel to oblique presentation might well change the difficulty.

Summary

Changes with age in the ability to copy forms were studied in preschool children between two and one-half and five years of age. The sample consisted of 108 children, with 18 in each of six half-year age groups, balanced for sex and for population group (white private, white clinic, and Negro). Two methods of conceptualizing developmental changes were contrasted—a discontinuity point of view emphasizing qualitative organizations typical of particular stages of development, and a continuity point of view emphasizing quantitative changes in the accuracy of reproduction.

To test whether specified qualitative organizations characterized the reproductions, each reproduction was judged as to whether it showed a change from the original in being more "primitive" or more "nonprimitive." Three characteristics of primitive organization—simplification, closure, and increased symmetry—and their logical opposites were judged. The major findings failed to confirm the predictions of this theoretical point of view. Simplification and closure were found to be more common in the reproductions of younger than of older children, but they were no more common than the opposite characteristics of complicating and opening. Both pairs of characteristics declined with age, and the decline was not differential. Increasing the symmetry of a reproduction was more common than decreasing the symmetry only in the three and one-half year group. The interaction with age was, however, significant and thus in line with the qualitative organization type of theory.

The reproductions were also judged as to whether they accurately reproduced eight characteristics—form, curvature-linearity, open-closedness, number of parts, relationship of parts, orientation on the background, size relationships, and intersections. The percentage of accurate reproductions increased with age for each of the characteristics judged and for each of the designs. There were no significant interactions of age and characteristics or of age and designs.

In view of these results, it was suggested that the most meaningful general statement to be made about developmental changes in the ability to reproduce forms is that the reproductions increasingly approach the original in all dimensions and that, in the course of so doing, errors both of under- and of over-estimation occur.

The order of difficulty of the 18 designs used was highly consistent in each of the preschool age groups and for the various accuracy characteristics. What aspects of the stimuli are associated with its difficulty remains a

matter for further investigation, although the number of parts and the acuteness of a change in direction appeared to be important variables in the sample of designs employed while spatial orientation apparently was not.

References

1. Attneave, F. Physical determinants of the judged complexity of shapes. *J. exp. Psychol.*, 1957, 53, 221-227.
2. Attneave, F., & Arnoult, M. D. The quantitative study of shape and pattern perception. *Psychol. Bull.*, 1956, 53, 452-471.
3. Harlow, H. F. Learning theories. In W. Dennis (Ed.), *Current trends in psychological theory*. Pittsburgh: Univer. of Pittsburgh Press, 1951. Pp. 57-84.
4. Piaget, J. How children form mathematical concepts. *Sci. Amer.*, 1953, 189(5), 74-79.
5. Werner, H. *Comparative psychology of mental development.* (Rev. Ed.) New York: International Universities Press, 1957.
6. Werner, H. The concept of development from a comparative and organismic point of view. In D. B. Harris (Ed.), *The concept of development.* Minneapolis: Univer. of Minnesota Press, 1957. Pp. 125-148.

SEX DIFFERENCES IN CHILDREN'S CONCEPTS OF JUSTICE

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Questioning subjects who ranged in age from 6 to 12 and who were from "the poorer parts of Geneva (Switzerland)," Piaget has proposed the theory that a child's understanding of what is just changes with increasing chronological age (12). For the younger child, he maintains, justice is to be sought in the authority person; for the older child it is to be found in reciprocity. Because Piaget's subjects represented only a single social-class stratum and because they were questioned only about stories depicting acts of physical aggression between children, the present writer, in earlier studies (2, 3, 4), questioned lower- and middle-class American children of various ages about situations of physical aggression and also about other kinds of possible infractions of justice related to property-rights and to character-reputation.

In the first of these studies (2) middle-class children were questioned about acts of physical aggression described in stories, and their responses failed to duplicate the Piaget finding that "children maintain with a conviction that grows with their years that it is strictly fair to give back the blows one has received" (12, p. 301). The youngest, but also the oldest, of the children in the group tended to seek the just restoration of right order in the authority person.

In another study (4) lower-class children were questioned about acts of physical aggression, and again, even though similar in economic status to Piaget's subjects, their responses failed to corroborate the Piaget proposal. A majority of the oldest subjects still sought justice in the authority person.

The third of these studies (3), again using middle-class children as subjects, posed problems about infractions of justice other than the one of physical aggression. Data in this study indicated, first of all, that reciprocity as a principle of justice was proposed most frequently and consistently by the youngest of the subjects and, secondly, that the total group of subjects made quite different kinds of judgments when questioned about different kinds of behavior.

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While this series of studies represented an attempt both to evaluate and to extend Piaget's work, none extended it in the direction of examining sex differences in children's concepts of justice. The present study, therefore, is designed to examine this variable by comparing boy- and girl-responses to identical kinds of stories.

Procedure

Subjects

The 190 subjects in this study, described in detail elsewhere (2, 4), were divided into two socioeconomic groups, middle- and lower-class. The middle-class group, consisting of 39 girls and 62 boys, were all of the second, fifth, and eighth graders in a Midwestern community-consolidated school. The second group, consisting of 51 girls and 38 boys, were also second, fifth, and eighth graders, but they were from an elementary and junior high school located in lower-class communities in a large West Coast city. On the assumption that societal pressures and expectations vary in different socioeconomic classes (1, 8, 11, 13, 14), responses of these two groups of subjects were analyzed separately.

Instrument

As has been described elsewhere (2), each subject, in an individual, tape-recorded interview, was questioned about various kinds of behavior depicted in five brief stories. For the female subjects, characters in these stories were always girls; for the male subjects, they were always boys. Other than this, however, the stories for each were identical.

The two stories designed to examine the subjects' understanding of rights regarding one's person were as follows:

(A) One day when they were out at recess, Bennett hit Van.
What should Van do?
Why?

(B) If, instead of hitting him, Bennett had kicked Van, what should Van have done then?
Why?

The subjects' understanding of rights regarding one's property was examined by means of the following stories:

(C) One morning in school Anton asked Cyril Hayes, the boy who sits in front of him, if he could use his eraser. Cyril said, "No." About a week later, Cyril was the one who didn't have an eraser, so he asked Anton if he could use his.
What should Anton do?
Why?

(D) In another room a boy by the name of Keith took a ruler off Russell Holec's desk and wouldn't give it back to him.
What should Russell do?
Why?

Following are two stories concerned with defamation of one's character. The first was included for the purpose of establishing possible grounds for an acceptance or rejection of reciprocity, and responses to it were not analyzed in this study. The second was designed to examine the subjects' understanding of rights regarding one's character-reputation.

(E) One morning in school, Basil copied answers from another boy's test paper, and his teacher caught him. Later, when the children were out on the playground at recess time, Alf, a boy in Basil's room, ran up to Basil and called, "Hi, cheater! Hi, cheater!"
What should Basil do?
Why?

(F) On another day, Alf was the one who was caught cheating.
What should Basil do?
Why?

As can be seen, each of these five stories provided an opportunity for subjects to accept or reject, directly or indirectly, the "eye for an eye" concept of justice described by Piaget as being positively related to CA. For stories A and B its acceptance was assumed if, when questioned, a subject proposed that a child has the right to hit or kick another child if he has hit or kicked him. Reciprocity responses for story C were those that maintained a child should not share his eraser with a child who had previously refused to share his; for stories D and F reciprocity responses were those proposing a child should take the property of another child if he has taken his and that he has the right to defame the character of another child if he has defamed his.

All other kinds of responses were categorized as being nonreciprocity responses.

Results

Boy-Girl Comparisons in the Low Socioeconomic Group

Responses of subjects in the low socioeconomic group are summarized in Table 1. Using chi square tests and Yates' correction for continuity (5, 6, 10) and using the 5 per cent level as the criterion of significance, the null hypothesis of no relationship between sex and type of response remained tenable for each story-situation at each of the three grade-levels and again when the grade levels were combined. Boy- and girl-responses showed the greatest difference when the eighth graders were questioned about story C (Refusing to Share Property), but even this difference was statistically significant only at the 10 per cent level of confidence ($\chi^2 = 3.0$).

A more detailed kind of analysis also failed to indicate any striking sex differences. For stories A and B (Aggressing Another), for example, girls as well as boys identified reciprocal behavior as a way of maintaining one's "self-respect":

> If she started it, she should hit her back and take up for herself. If she don't, she'd be showing other people she's scared. (G, VIII)

TABLE 1

FREQUENCY DISTRIBUTION OF TWO KINDS OF RESPONSES FOR BOYS AND GIRLS IN THE LOW SOCIOECONOMIC GROUP

Kind of Response	*Grade II* B	G	*Grade V* B	G	*Grade VIII* B	G	*Grades II, V, VIII* B	G
(A) *Aggressing Another (hitting)*								
Reciprocity	1	5	1	4	5	5	7	14
Nonreciprocity	12	10	11	14	8	13	31	37
(B) *Aggressing Another (kicking)*								
Reciprocity	1	6	1	3	5	5	7	14
Nonreciprocity	12	9	11	15	8	13	31	37
(C) *Refusing to Share Property*								
Reciprocity	10	11	1	8	6	2	17	21
Nonreciprocity	3	4	11	10	7	16	21	30
(D) *Taking Another's Property*								
Reciprocity	1	2	0	0	0	0	1	2
Nonreciprocity	12	13	12	18	13	18	37	49
(F) *Defaming Another's Character*								
Reciprocity	8	11	1	6	3	2	12	19
Nonreciprocity	5	4	11	12	10	16	26	32

Both boys and girls, again for stories A and B, saw nonreciprocal behavior, in the form of reporting the aggression to an authority person, as a practical way to avoid further trouble:

> If he hit back, he'd get into a lot of trouble, and it's no use that he get in trouble if the other boy started it. (B, V)
>
> If she hit back, there'd be a fight, and then the police would come and they'd be put in the Juvenile Home. (G, VIII)

For story C (Refusing to Share Property), the boys and the girls who proposed reciprocal behavior explained their response in terms of the principle, "Do unto others as they do unto you." Those who advocated sharing, a nonreciprocity response, did so for such reasons as: to be kind, to show friendship, to practice the Golden Rule, and to encourage in the future more generous behavior on the part of the selfish child in the story. This last reason, showing a pragmatic concern for one's own future welfare ("If you let him use it, maybe next time he'll let you use his eraser."), was particularly mentioned by the fifth-grade boys; this, in turn, might be one explanation for what seems to be an increase in their "generosity" at this grade-level (*see* Table 1).

For story D (Taking Another's Property), both the boys and the girls at each of the three grade-levels were almost unanimously opposed to a

child's taking property belonging to a child who has taken his. Instead, they recommended reporting the offense to an authority person, and for the following kinds of reasons:

> It's not fair that she take the ruler off her desk. (G, II)
> If he tried to take it back, it might start a fight. (B, V)
> If she didn't tell, she'd never get her ruler back. (G, V)

None of these various kinds of reasons was especially prevalent among the boys or the girls.

For story F (Defaming Another's Character), the boys and the girls who proposed reciprocity again unanimously advocated the principle, "Do unto others as they do unto you." Those who gave nonreciprocity responses to this story were also in unison in their suggestion that the offended boy do nothing and for the following kinds of reasons:

> Cause two wrongs don't make a right. . . . On Mickey Mouse (TV program) the man told me that. (B, II)
> He wouldn't want anyone to call him names, so why call him names? (B, V)
> That's embarrassing. Maybe next time if she'd do something wrong, the other girl might say, "Well, she gave me a chance, so I'll give her one." (G, VIII)

Once more, neither of these kinds of reasons was especially prevalent among the boys or the girls.

Boy-Girl Comparisons in the Middle Socioeconomic Group

Responses of the 101 subjects in the middle socioeconomic group are summarized in Table 2. Again using chi square tests and Yates' correction for continuity and using the 5 per cent level as the criterion of significance, the null hypothesis of no relationship between sex and type of response remained tenable for each of the five stories. The greatest boy-girl differences in response were for story A (Hitting) at the fifth-grade level, and when the three grade-levels were combined; each of these was significant at the 10 per cent level of confidence ($\chi^2 = 2.7$ and 3.2, respectively).

When a more detailed analysis was made of the data, it was found, first of all, that the responses of these middle-class subjects, as well as the reasons they gave for them, were similar, in kind, to those given by the lower-class subjects. A second similar finding was the fact that this more detailed analysis again revealed little by way of "hidden" sex differences. When these middle-class subjects' nonreciprocity responses to stories A and B were examined, for example, they were found to be predominantly "Tell an authority person" kind of response and, except for the eighth graders, boys and girls appeared equally willing to "tell." At the eighth-grade level 86 per cent of the boys who gave nonreciprocity responses proposed telling an authority person about the offense; but, among the girls, only half of their nonreciprocity responses suggested "telling." The other 50 per cent

TABLE 2

FREQUENCY DISTRIBUTION OF TWO KINDS OF RESPONSES FOR BOYS AND GIRLS IN THE MIDDLE SOCIOECONOMIC GROUP

Kind of Response	*Grade II* B	G	*Grade V* B	G	*Grade VIII* B	G	*Grades II, V, VIII* B	G
(A) *Aggressing Another (hitting)*								
Reciprocity	5	3	12	3	4	0	21	6
Nonreciprocity	11	9	11	12	19	12	41	33
(B) *Aggressing Another (kicking)*								
Reciprocity	7	4	9	4	4	0	20	8
Nonreciprocity	9	8	14	11	19	12	42	31
(C) *Refusing to Share Property*								
Reciprocity	11	9	8	7	6	0	25	16
Nonreciprocity	5	3	15	8	17	12	37	23
(D) *Taking Another's Property*								
Reciprocity	1	1	2	0	1	0	4	1
Nonreciprocity	15	11	21	15	22	12	58	38
(F) *Defaming Another's Character*								
Reciprocity	9	6	7	1	2	0	18	7
Nonreciprocity	7	6	16	14	21	12	44	32

were divided among proposals that suggested one should walk away from the aggressor, verbally chastise her, and ignore her aggressiveness.

The only other kind of boy-girl difference noted in the more detailed analysis of middle-class subjects' responses—and this was not statistically significant—was that found for story C. Here, fifth-grade boys, at least in their expressed judgments, appeared to be more "generous" than the fifth-grade girls, whereas at the eighth-grade level it was the girls who seemed relatively more "generous." However, as was true for the lower-class subjects, concern for one's own ultimate welfare was evident in some of the "generous" (nonreciprocity) responses. When questioned about why they thought a child should share an eraser with a child who has previously refused to share his, 65 per cent of the fifth- and eighth-grade girls, and 34 per cent of the fifth- and eighth-grade boys gave such reasons as:

> Because in the Bible it says you're supposed to be forgiving, and then maybe next time she'd let her use hers. (G, V)
>
> He ought to tell him, "If I let you use this, can I use yours sometime?" (B, VIII)

DISCUSSION

As has been shown, no statistically significant sex differences in children's concepts of justice were found in this study. Reasons for this lack of differ-

ence could lie (a) in the nature of the stories used, (b) in the nature of the interview-situation and—since it is assumed here that a child's moral concepts are learned rather than innate—(c) in the nature of the subjects' moral training.

Examination of the nature of the five stories used in this study shows that at least three of them described behaviors that have come to be associated with a particular sex; that is, stories A and B, in depicting physical aggression, portray "masculine" behavior whereas story F, in its concern for a kind of verbal aggression, deals with what is usually seen as being "feminine" behavior. Yet, even for these three stories, no significant sex differences in response were found.

This lack of difference, as was noted above, could also be a function of the interview-situation in which the responses were elicited, especially of the kind and degree of rapport established between interviewer and interviewee. Were good rapport lacking, there would probably be a strong tendency on the part of subjects to respond in ways that would be most likely to please the adult interviewer, thus creating the tendency, too, to respond in *similar* ways. In this study it could be assumed that reciprocity responses would seem, to the subjects, less pleasing to adults than nonreciprocity responses; yet, one-fourth (25.2 per cent) of all their responses were of the reciprocity type. Because of this finding, it is assumed that subjects in this study felt at least relatively free to say what they really thought and felt or had been taught and that the lack of sex differences in their responses was not a function of the interview-situation.

It is therefore hypothesized that these boy-girl responses were similar because the kind of moral training given to children is not affected by the sex of the child. It is also hypothesized that studies which have described differences in the actual behavior of boys and girls (7, 9, 15, 16) were noting the end-result, not of differences in their training, but rather of important differences in the pressures exerted on boys and on girls, by parents, teachers, and peers, to adhere to the various precepts and values defined in this training process. Obviously, if these hypotheses are to be confirmed or refuted, other research will have to be carried out. Ideally, this would involve large numbers of subjects and would closely examine, especially within the home, the kind of moral training that is, in fact, being given to children and, further, the kinds and consistency of pressure which is brought to bear on boys and on girls to adhere to this training in their everyday behavior.

Summary

The present investigation, as an attempt to extend the work of Piaget, was designed to examine sex differences in children's concepts of justice. Like the Piaget study, behavioral violations of rights regarding one's person and also of rights regarding one's property and character were depicted in brief story-situations. Boys and girls of lower- and middle-class back-

grounds and of three different grade-levels were systematically questioned about them in individual, tape-recorded interviews. Chi square tests were used to analyze the data, and in each of these tests the null hypothesis of no relationship between sex and type of response remained tenable.

References

1. Davis, A., & Havighurst, R. *Father of the man.* Boston: Houghton Mifflin, 1947.
2. Durkin, Dolores. Children's concepts of justice: a comparison with the Piaget data. *Child Develpm.*, 1959, 30, 59-67.
3. Durkin, Dolores. Children's acceptance of reciprocity as a justice-principle. *Child Develpm.*, 1959, 30, 289-296.
4. Durkin, Dolores. Children's concepts of justice: a further comparison with the Piaget data. *J. educ. Res.*, 1959, 52, 252-257.
5. Edwards, A. L. *Experimental design in psychological research.* New York: Rinehart, 1950.
6. Finney, D. J. The Fisher-Yates test of significance in 2×2 contingency tables. *Biometrika*, 1948, 35, 145-156.
7. Fite, Mary D. Aggressive behavior in young children and children's attitudes toward aggression. *Genet. Psychol. Monogr.*, 1940, 22, No. 2.
8. Harrower, M. R. Social status and the moral development of the child. *Brit. J. educ. Psychol.*, 1934, 3, 75-95.
9. Jones, V. Character development in children—an objective approach. In L. Carmichael (Ed.), *Manual of child psychology.* New York: Wiley, 1946. Pp. 707-751.
10. Latscha, R. Tests of significance in a 2×2 contingency table: an extension of Finney's table. *Biometrika*, 1953, 40, 74-86.
11. Milner, Esther. Effects of sex role and social status on the early adolescent personality. *Genet. Psychol. Monogr.*, 1949, 40, No. 1.
12. Piaget, J. *The moral judgment of the child.* New York: Harcourt, Brace, 1932.
13. Pope, B. Prestige values in contrasting socio-economic groups of children. *Psychiatry*, 1953, 16, 381-385.
14. Rainwater, Lee. A study of personality differences between middle and lower class adolescents: the Szondi test in culture-personality research. *Genet. Psychol. Monogr.*, 1956, 54, No. 11.
15. Sears, Pauline S. Doll play aggression in normal young children. *Psychol. Monogr.*, 1951, 65, No. 6.
16. Terman, L. M. Psychological sex differences. In L. Carmichael (Ed.), *Manual of child psychology.* New York: Wiley, 1946. Pp. 954-1000.

RELATIONSHIPS BETWEEN ETHNOCENTRISM IN CHILDREN AND THE ETHNOCENTRISM AND AUTHORITARIAN REARING PRACTICES OF THEIR MOTHERS

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Ever since Lasker's (8) classical anecdotal account of *Race Attitudes in Children,* social scientists have been investigating the origins and development of ethnocentrism in children. Two hypotheses have appeared most often. Horowitz and Horowitz (7), who may be considered spokesmen for the first group, have said, ". . . the development of attitudes of southern children toward Negroes has its origins in community pressures brought to bear upon the parents, who transmit them to the children. As they grow older, the children tend to forget the origins of their attitudes just as parents forget having taught them to the children. As the origins are forgotten, rationalizations are developed to support the attitudes" (p. 336), or more succinctly, "Attitudes toward Negroes are now chiefly determined not by contact with Negroes but by contact with the prevalent attitude toward Negroes" (6, pp. 34-35). The ethnocentrism of the parents who are influential bearers of this prevalent attitude is believed to be taught to their children just as attitudes towards religions or political parties are taught.

A second hypothesis concerns the influence of childrearing practices on the development of prejudiced attitudes. Frenkel-Brunswik (2) reports that "They [parents of highly ethnocentric children] use more harsh and rigid forms of discipline which the child generally submits to rather than accepts or understands. . . .The hypothesis may be offered that it is this repressed resentment towards authority which is displaced upon socially inferior and foreign groups" (p. 302). According to this viewpoint, if parents employ authoritarian childrearing practices, then we would expect their children to be more ethnocentric than children of parents who do not employ authoritarian rearing practices.

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Child Develpm., 1960, 31, 369-376.

While some experimental evidence has been offered to support both these hypotheses, it has been pointed out that:

> We should emphasize that the possible indirect role of parents in shaping intergroup attitudes through the establishment of a particular kind of personality structure in their children has not yet been conclusively demonstrated, since the same parents who follow child-rearing practices thought to be conducive to the formation of "authoritarian personalities" are in general also the ones who have the greatest number of specific prejudiced attitudes to transmit directly. However, the correlation in parents between ethnic attitudes and child-rearing practices is far from perfect, so it should be possible to find parents matched for ethnic attitudes (and preferably also for social and economic characteristics) who differ radically in severity toward their children. If under these conditions more authoritarian treatment by the parents was associated with greater prejudice in the children, the influence of parents on attitudes by way of personality structure would be well established (3, p. 1046).

This study was designed to fill partially the need for a control of parental prejudice (restricted to mothers' prejudice in this study) while investigating the effects of authoritarian childrearing practices on the development of prejudice in children. Similarly, it also seemed desirable to control authoritarian rearing practices in investigating the effects of prejudiced attitudes of mothers on the ethnic attitudes of their children so that some comparison of the relative importance of mothers' ethnocentrism and authoritarian rearing practices in the development of children's prejudiced attitudes could be made.

Procedure

A measure of ethnocentrism was administered to 400 children in the sixth and seventh grades in a predominantly middle-class suburb of Columbus, Ohio. Seeman's (10) modification of a social distance test used by Hartley (5), which was in turn based upon the Bogardus test, was used as the measure of ethnocentrism in children. The children assigned numbers corresponding to varying degrees of social distance which they considered appropriate to 10 ethnic groups. The scores had a possible range of 10 to 70. The measure was administered in the class room by either the teacher or the experimenter. The scores of the 161 children who composed the final sample ranged from 10 to 48 with a mean of 30.4 and a median of 31.

Test-retest reliabilities of .92 for a fourth grade class ($N = 43$) and .85 for a smaller group of 34 seventh graders (both corrected by the Spearman-Brown formula) have been reported for this measure (10). In the same classes split-half reliability correlations of .96 and .94 were found. Seeman offers interview data with the children in his sample to support his position that the instrument is making valid discriminations in attitude.

A questionnaire designed to yield a measure of ethnocentrism and authoritarian rearing practices was sent to the mothers of these children.

A slightly modified form of the suggested final E (Ethnocentrism) scale contained in *The Authoritarian Personality* (1) was used as a measure of the expressed ethnocentrism of the mothers. The items composing the subscale concerning "Negroes" and "Jews" were unchanged. Two of the items of the "Other Minorities and Patriotism" subscale were deleted, and two of the items were given slightly altered wording in an attempt to reflect changed world conditions (e.g., the U.N. is no longer new). A Likert-type scoring system was employed. The numbers +3, +2, +1, −1, −2, −3 were assigned to the categories *strongly agree, moderately agree, agree, disagree, moderately disagree,* and *strongly disagree.* These numbers were added to a base of 4 and yielded a possible range for the 18 items of 18 to 126. The scores from the sample of mothers ranged from 18 to 116 with a mean of 62.2 and a median of 62.

While the authors do not report reliabilities for this final form of the E scale, they report the reliabilities of various earlier versions of the scale and indicate that the reliability is probably around .85. The authors of *The Authoritarian Personality* offer case study material as validation of the E scale.

A questionnaire composed of items appearing in the Gough, Harris, and Martin "Opinions on Child Training" questionnaire (4) was used to measure the rearing practices of the mothers. The authors indicate that the original scale was based in part on material published by Radke (9) and Shoben (11) and on unpublished material in the files of the Institute of Child Welfare at the University of Minnesota. Nineteen items which reflected parental opinion toward authoritarian rearing practices were selected from part I of the original scale. These items were not altered in any way. A Likert-type scoring system identical to the one employed with the E scale was utilized rather than the true-false categories suggested by the original authors. The Likert scaling is believed to take into consideration more subtle differences in response than do the dichotomous categories. The possible range of scores was 19 to 133, while the obtained range was 31 to 123 with a mean of 76.0 and a median of 76.

The questionnaires had been secretly coded to enable the mothers to retain a feeling of anonymity. A stamped self-addressed envelope was enclosed for convenient return of the questionnaire. As an added incentive, a free raffle ticket for a wall can opener to be awarded to one of the mothers returning the questionnaire was included. One hundred and sixty-one questionnaires were returned in usable form. The purpose of the measures which were sent to the mothers was somewhat disguised by describing the questionnaire as a survey designed to secure reliable information about what mothers in general actually thought about certain childrearing practices and to determine what their attitudes were in a number of social areas. There was no evidence that the mothers made any association between the questionnaires sent to them and the measurement of the children's ethnocentrism.

Results

The first statistical analysis was an intercorrelation of the three measures employed in the study. The product-moment correlation between mothers' ethnocentrism scores (E) and mothers' authoritarian rearing practices (ARP) was +.48. The product-moment correlation between children's prejudice, as measured by the social distance scale, and the E scores of the mothers was +.32 ($N = 161$, $p < .001$). A partial correlation of +.33 was obtained between E scores and children's prejudice scores with the ARP scores partialed out.

The product-moment correlation between children's prejudice scores and ARP scores was +.06, which was not significant. A partial correlation of −.01 was obtained between ARP scores and the prejudice scores of the children with the E scores partialed out.

As an additional test of the relationships among these measures, children's prejudice scores were categorized in the following three ways: those whose mothers' E scores were in the extreme quartiles, those whose mothers' ARP scores were in the extreme quartiles, and, finally, those whose mothers' scores fell in the extreme quartiles, and in the same direction, on both the E and ARP scales. These data are presented in Table 1.

Table 1

DIFFERENCES BETWEEN MEANS OF CHILDREN'S PREJUDICE SCORES ON THE BASIS OF MOTHERS' SCORES ON THE E SCALE, ARP SCALE, AND THE E AND ARP SCALES

Scales	*Mean*	*SD*	*N*	*t*	*p*
1. High ARP	31.1	8.4	43	.90	.....
Low ARP	29.4	8.6	39		
2. High E	34.2	7.2	37	4.53	< .001
Low E	26.2	7.6	37		
3. High E and High ARP	34.4	7.1	18	3.09	< .01
Low E and Low ARP	26.7	7.8	17		

These results unequivocally support the conclusion that ethnic attitudes of children are related to the ethnic attitudes of their mothers and cast doubt on the existence of any significant relationship between ethnic attitudes of children and the authoritarian rearing practices of their mothers.

Additional tests were performed to determine the possible presence of any relationship between the ARP scale and children's prejudice scores. Children's scores were divided into six groups on the basis of their mothers' combined placement on the E and ARP scales. Only those children's scores were considered which had the mothers as high on both the E and ARP

scales, low on both these scales, or high on one scale and low on the other. The classification into groups was hampered by the .48 correlation between the E and ARP scales. Of necessity, the groups based on one low score and one high score are relatively small. High and low were arbitrarily defined as .25 standard deviations above and below the mean, respectively. These data are presented in Table 2.

TABLE 2

DIFFERENCES BETWEEN MEANS OF CHILDREN'S PREJUDICE SCORES ON THE BASIS OF MOTHERS' COMBINED HIGH E AND HIGH ARP, LOW E AND LOW ARP, HIGH E AND LOW ARP, AND LOW E AND HIGH ARP

Scales	*Mean*	*SD*	*N*	*t*	*p*
1. High E, High ARP ...	32.8	7.2	32	3.71	< .001
Low E, Low ARP	26.2	7.2	36		
2. High E, Low ARP	31.8	8.7	15	2.02	< .05
Low E, Low ARP	26.2	7.2	36		
3. High E, High ARP ...	32.8	7.2	32	1.09	.....
Low E, High ARP	29.6	8.9	13		
4. High E, High ARP ...	32.8	7.2	32	.38	.....
High E, Low ARP	31.7	8.7	15		
5. Low E, High ARP	29.6	8.9	13	1.20	.....
Low E, Low ARP	26.2	7.2	36		
6. High E, Low ARP	31.7	8.7	15	.61	.....
Low E, High ARP	29.6	8.9	13		

It will be noted that no comparisons involving high and low ARP groups achieve significance. When the groups are high on E and low on ARP, in one instance, and low on E and high on ARP, in the other instance (comparison 6), the difference, though not significant, is in the direction contrary to a positive relationship between ARP and children's prejudice.

As a final test, mothers whose E scores were within one point were selected so that one member of this matched pair's score on the ARP scale would fall in the upper third of the range of scores on this latter variable and the other member's score would fall in the lower third. The same procedure was used to select groups of children's prejudice scores with mothers matched on ARP and with one member of the pair in the upper third and the other in the lower third on the E measure. When more than one match between individuals was possible, pairs were first matched on the basis of identical scores, and then, if more than one possibility remained for pairs who were one point apart, they were matched by chance. Incidentally, the first of these two tests relates directly to the suggestion offered

by Harding *et al.* (3) which was cited earlier. Also germane to this particular test and to the results in general is the fact that our children were drawn from a suburban, upper-middle class community which is relatively homogeneous for social and economic characteristics. The data for these two tests are presented in Table 3.

TABLE 3

DIFFERENCES BETWEEN MEANS OF CHILDREN'S PREJUDICE SCORES WITH MOTHERS MATCHED ON ARP OR E AND ONE MEMBER OF PAIR IN UPPER THIRD AND OTHER MEMBER OF PAIR IN LOWER THIRD ON NONMATCHED VARIABLE

Scales	*Mean*	*SD*	*N*	*t*	*p*
1. Matched on E					
Upper ⅓ ARP	29.6	8.2	30	1.53	$>.10$
Lower ⅓ ARP	32.8	8.5	30		
2. Matched on ARP					
Upper ⅓ E	33.6	8.7	23	2.37	$<.05$
Lower ⅓ E	28.1	7.8	23		

The results of the first test, though not significant, is in a direction opposite to that of a positive relationship between ARP and children's prejudice.

DISCUSSION

At first blush, the present results contradict one of the assertions of the Authoritarian Personality study, namely that a commitment to power-oriented childrearing methods is likely to produce a social philosophy that rejects outgroups. Nonetheless, the results do pose a problem in interpretation for which no alternative to the "authoritarian" hypothesis seems altogether satisfactory. How is it that ethnocentrism and authoritarianism are correlated in the mothers' responses, but children's prejudice is related to their mothers' ethnocentrism and not their authoritarianism?

Many explanations seem possible, but one that appears particularly plausible would invoke the specificity of children's attitudes. The transmission of ethnic prejudice from mother to child is certainly not surprising since children may easily adopt prejudiced attitudes if these are displayed by parents who typically have great reinforcement value. However, the effects of authoritarian childrearing practices may require a considerable number of life-experiences to become manifest. Central personality dispositions, such as authoritarianism, cannot be learned and taken over directly, but require a long history of cumulative experience for parental influence to take effect. The sorts of frustrating experiences that lead to extreme repression and conventionality with consequent projection of unacceptable

impulses onto outgroups are ordinarily absent from the world of children who range in age from 11 to 13. In later life, when competition with peers becomes a more realistic consideration and the pressure of the adult world becomes more directly intrusive, the need to focus resentment on particular groups, if it exists as a result of cumulative frustration, will become overt. With respect to the attitudes of children, however, we are inclined to agree with the Horowitz position (6) that an attitude toward a minority group is determined principally by contact with the prevalent attitude toward that group, and, for children in the age group sampled by this study, the attitude of the mother would certainly be relevant. (This explanation is also intended to account for the significant relationship between the E and ARP scales.) Our speculation is, of course, open to empirical test. In about five years' time our present sample can be retested, and, if our prediction is correct, the correlation between ARP and children's prejudice should be significantly positive. Alternatively, a current test of the hypothesis could be made with a group of young adults such as college students.

Summary and Conclusions

Social scientists have tended to adopt two hypotheses concerning the formation of ethnic attitudes in children. One hypothesis stresses the social climate, and particularly the home, in which the attitudes are learned. In general, this hypothesis places little emphasis on deep-seated personality factors in its view of the etiology of ethnic prejudice. The other, more personality-centered hypothesis stresses the invidious effects of authoritarian rearing practices that culminate in displaced hostility onto ethnic minorities. This study was designed to present supplementary evidence concerning these two hypotheses and to investigate their relative importance.

A social distance measure of ethnocentrism was administered to 400 sixth- and seventh-grade children in a predominantly middle-class suburb of Columbus, Ohio. Secretly coded questionnaires were filled out and returned by 161 mothers. These questionnaires included the California E scale and selected items on authoritarian rearing practices taken from the Gough, Harris, Martin "Opinions on Child Training" scale.

The results demonstrated that, although there is a significant relationship between the ethnic attitudes of mothers and the attitudes toward authoritarian rearing practices of these mothers, the ethnic attitudes of children are related only to the ethnic attitudes of their mothers and not to the attitudes toward authoritarian rearing practices of their mothers. A speculation was offered for this result which combines both hypotheses.

References

1. Adorno, T. W., Frenkel-Brunswik, Else, Levinson, D. J., & Sanford, R. N. *The authoritarian personality.* New York: Harper, 1950.

2. FRENKEL-BRUNSWIK, ELSE. A study of prejudice in children. *Hum. Relat.*, 1948, 1, 295-306.

3. HARDING, J., KUTNER, B., PROSHANSKY, H., & CHEIN, I. Prejudice and ethnic relations. In G. Lindzey (Ed.), *Handbook of social psychology*. Vol. II, *Special fields and applications*. Cambridge, Mass.: Addison-Wesley, 1954. Pp. 1021-1061.

4. HARRIS, D. B., GOUGH, H. G., & MARTIN, W. E. Children's ethnic attitudes: II. Relationship to parental beliefs concerning child training. *Child Develpm.*, 1950, 21, 169-181.

5. HARTLEY, E. L. *Problems in prejudice*. New York: King's Crown Press, 1946.

6. HOROWITZ, E. L. The development of attitudes toward the Negro. *Arch. Psychol. N.Y.*, 1936, No. 194.

7. HOROWITZ, E. L., & HOROWITZ, RUTH E. Development of social attitudes in children. *Sociometry*, 1938, 1, 301-338.

8. LASKER, B. *Race attitudes in children*. New York: Holt, 1929.

9. RADKE, MARIAN J. The relation of parental authority to children's behavior and attitudes. *Univer. Minn. Inst. Child Welf. Monogr.*, 1946, 22.

10. SEEMAN, M. Prejudice and personality: a study in the social psychology of attitudes. Unpublished doctoral dissertation, Ohio State Univer., 1947.

11. SHOBEN, E. J. The assessment of parental attitudes in relation to child adjustment. *Genet. Psychol. Monogr.*, 1949, 39, 101-148.

STATUS IN THE INFORMAL GROUP: INFLUENCE AND INFLUENCIBILITY AT DIFFERING AGE LEVELS[1]

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The importance of status in the informal group as a factor that relates both to one's influencibility and influence of others has been recognized by several writers concerned with related issues. Yet very little experimental effort has been expended toward delineating the effects of specific status positions within the group hierarchy; and even greater is the paucity of effort aimed at establishing the chronological age levels at which status evolves as a major determinant of patterns of influence in the small group. This study sought to investigate the reciprocal relationships of status in the informal group to influence and influencibility as a function of the chronological ages of the group members. Information was also gathered on the adjunctive question of the relationship between status and popularity at differing age levels.

Both empirical and experimental bases exist for the prediction of greater influence on other members by the leader and other higher ranking members (3, 5, 6), at least at the adult or near-adult level. The picture concerning the weight of status in influencibility by other members is, however, more complex and less clear. Logical bases exist that would be compatible with the greatest conformity or influencibility of the occupant of almost

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any status position within the group. For example, one of the key determinants of a member's influencibility by the deviant judgments of other group members is his striving to gain and maintain status within his reference group (2). The higher a member's motivation to attain these status ends, and hence the greater his dependency on the group for satisfaction of this motive, the greater should be his susceptibility to influence from other members, particularly from the higher status members.

The hypothesis that motivation is a simple function of the distance from the goal, as well as the possibility of expulsion from the group with loss of his lowly position, would favor greatest striving and conformity on the part of the lowest status man. And yet the very remoteness of the lowest status man from the top position might result in his being less motivated to try to move up the status ladder and consequently in his being less susceptible to influence by discrepant judgments of other members, especially if his position were a secure one.

The second ranking person could prove to be the member on whom the goal of the top position exercises greatest motivational pull. Studies relating to goal gradient, level of aspiration, and class mobility seem to be consistent with this possibility, as well as are the findings of Dittes and Kelly (1). These authors found the highest incidence of conformity to group evaluations in both private and group surveillance situations to occur among those individuals who had been led to believe that their degree of acceptance by the other members was average, which in this case was next to the highest of the four degrees of induced acceptance.

The leader or highest ranking member's behavior should be less affected by the striving for the top position than that of the lowest or next to highest status member by virtue of his having attained that goal. The attainment of the top position, however, exposes the leader to pressures from a new source, that of maintaining the leadership status. If his position were a secure one, the leader could afford perhaps to deviate further from the behavior of the other members (2, 4); but, if insecure in his position, the leader might be the most susceptible to group pressures because of the greater psychological distance he could fall if displaced from the apex of the hierarchy.

Important procedural differences in the present study add further to the uncertainty of the relationship that should be expected here between status and influencibility. The "issue" of this study was, purposely, a non-involving one, being related neither to a group norm nor to strong personal attitudes of the participants. Moreover, the method of inducing influence deviated from the more typical approaches. The discrepant evaluation instead of being presented as *majority opinion,* as is more usual, was in this study introduced as emanating from *single* individuals, those of highest and lowest status within the subject's own informal group.

Any effect of status in influencing others or resisting their influence assumes a certain level of social development of the participants. The age

at which status and role relations become important determinants of behavior is undoubtedly quite early in childhood. Yet these social relations seem to remain for several years in a state of flux, moving toward greater stability with the approach to adulthood. Thus, for example, the weight of status in the influence patterns within the informal group should be less at the third than the eleventh grade, the extreme age levels included in this study.

Despite its being an old question, still little is known of the relationship between status and popularity when viewed developmentally. The extent of the relationship should at all age levels be expected to vary somewhat with the demands of the particular situation, which in turn would give rise to the degree of differentiation between effective initiative and friendship. The degree of differentiation between friendship and leadership characteristics could become so marked that one's choice of a friend would bear little relationship to his choice of a leader. The condition conducive to such a situation would probably be one where great value is attached to job proficiency, such as in military combat. On the other hand, such a minimal distinction could be made between friendship and leadership qualities that a perfect correlation would obtain between one's standing on these two dimensions. This latter possibility would be more likely among younger, undifferentiating children and in situations where task proficiency is not so highly valued.

Method

Test Materials

The materials consisted of two sociometric questionnaires, enlarged reproductions of five pairs of pictures from the Meier Art Judgment Test (MAJT) and small answer booklets in which the subjects indicated their picture preferences subsequent to the "communication."

The sociometric questionnaires were used to obtain measures of status and popularity at the different age levels. The requisite of making the criterion questions relevant to activities characteristic of a given age necessitated the construction of separate questionnaires for the lower (third and sixth grades) and the higher (ninth and eleventh grades) age levels. Questions aimed at popularity and leadership were included in both questionnaires, the difference being that the specific situations to which the questions related were different for the higher and lower age groups. The criteria for leadership related to the initiation and direction of group activities in various specific situations, while the popularity questions were meant to ascertain personal liking for individual members.

The MAJT presents to the individual pairs of pictures in booklet form, the intrapair similarity of which ranges from high to almost identity. The task of the subject is to indicate his preference for one of the pictures in the pair. For this study five pairs of pictures were selected, four of which

were used as camouflage for the attempts at influencing preferences for the *remaining pair,* which served as the *critical stimulus* or the *opinion issue* of this study. In choosing the critical stimulus, the aim was to select a pair of pictures sufficiently similar to preclude strong preference for one over the other, but not so similar as to destroy the reliability of preferences under noninfluence choice situations. Incidence of change in preference on the critical pair of pictures provided the measure of effectiveness of the influence attempts. Enlarged reproductions of all the pictures were made so they could be seen clearly by all students, thereby allowing the "test" to be used in a group situation which was necessary for this study.

Procedure

The experiment was carried out in two sessions, each in natural classroom settings. In the first session sociometric measures of popularity and status were obtained, and subjects indicated their preferences for the critical stimulus (which was presented as a sample of the art test to follow a week later). In the second, the influence session, subjects were informed of the first session preferences of the highest and lowest status individuals in their own informal group after which they again recorded their preference for the critical stimulus along with their choices for the noncritical pictures.

The influence attempt was made to appear as a logical sequence in the administration of the art test. The first step in the second session was passing out to each subject a specially prepared answer booklet on which his (her) name had been written earlier by the experimenters. In this preassigned booklet was contained the communication intended for that specific recipient. This message was conveyed in the simple note that "———chose left," "———chose right," penned by the experimenters on the bottom of the "sample" page, the page on which the preference for the critical stimulus following the influence attempt was to be recorded. The names of the highest and lowest ranking members in the subject's own informal group were always inserted in the two blanks. The first session choices of the highest and lowest status members were thus always presented as opposites. When the highest status member, or leader, was represented as having agreed with the subject in his initial preference, the lowest status individual was depicted as having chosen the opposite picture, and vice versa.

Two experimental conditions were thus provided: highest status disagree - lowest status agree (*HSD-LSA*) and lowest status disagree - highest status agree (*LSD-HSA*). Subjects within each of the 12 classes were divided approximately equally among these two experimental conditions and a control group in which subjects received no information concerning preferences of others. It was thought that the simultaneous exposure of the individual to contradictory influences would provide a more valid index of the differential influence of the highest and lowest status members. It was this assumption that gave rise to the selection of the particular stimulus ("issue") used in this study, one dictating dichotomous responses and thus

allowing for two sources plausibly to be represented as maintaining opposite stands.

Presentation of the communication was rationalized to the subjects as being intended to give them an idea of the choices of some other class members on the sample picture. To allay suspicion within the control group, it was pointed out that only in some of the answer booklets, selected by chance, had the information on others' preferences been included. This explanation preceded the subjects' turning to the "sample" page on which was written the communication. The critical ("sample") picture was then presented, and, after recording their postcommunication choices on it, subjects were then "tested" with the four pairs of noncritical pictures. All pairs of pictures, critical and camouflage, were shown for 10 seconds. Subjects indicated their preferences by checking on the appropriate page of the answer booklet in front of the letter "L" or "R" for the left or right picture of the pair. The pictures of each pair were clearly labeled "L" or "R" to prevent positional error in recording of choices.

To reduce the danger of their suspecting the true purpose of the study, *Ss* were not permitted to talk nor to compare notes during the experiment. All *Ss* appeared to accept the study as a test of art ability in line with its announced rationale.

Subjects

Pre- and postcommunication measures, along with sociometric data, were obtained from 405 *Ss*. This number was comprised of students from three third grade, two sixth grade, three ninth grade, and four eleventh grade classes. The total number of *Ss* from the third grade was 102, from the sixth grade 57, from the ninth grade 77, and from the eleventh grade 169. For all grades and classes combined, 149 *Ss* served in the HSD-LSA experimental condition, 132 in the LSD-HSA condition, and 124 in the control group.

Results and Discussion

This study was concerned primarily with three questions: (a) the differential influence of highest and lowest status members of an informal group on the opinions of the other group members at different developmental stages; (b) relationship of an individual's status in the group to his own influencibility; and (c) relationship of popularity to status and effective initiative at different age levels. The measure of opinion change was the incidence of reversal of choices on the critical pair of pictures.

Comparative Effectiveness of High and Low Status Sources at Different Ages

In Table 1 is presented a comparison of the frequency of change in the experimental and control conditions for the total sample and for each of the four grade levels.

The total incidence of change in the HSD-LSA condition across age levels was clearly greater than in the LSD-HSA condition ($\chi^2 = 21.76$, $p < .001$, 1 *df*). The number of changers in the HSD-LSA condition was also significantly greater than in the control group ($\chi^2 = 7.72$, $p < .01$, 1 *df*), while in the LSD-HSA situation the frequency of preference shifts was significantly fewer than in the control group ($\chi^2 = 4.18$, $p < .05$, 1 *df*). Thus, the over-all net effect of simultaneous contradiction by the leader and support by the lowest status man was a tendency to shift toward the choice of the leader. And, conversely, support by the leader coincident with disagreement by the lowest ranking person tended to reinforce the individual's initial preference.

At the third grade level the difference in the number of changers between the two experimental conditions was not significant, nor was the incidence of change in either of these conditions significantly different from change in the control group.

TABLE 1

PROPORTION AND PERCENTAGE OF INDIVIDUALS CHANGING PREFERENCE IN THE EXPERIMENTAL AND CONTROL CONDITIONS

	HSD-LSA $N = 149$		LSD-HSA $N = 132$		CONTROL $N = 124$	
Grade	*Proportion*	%	*Proportion*	%	*Proportion*	%
3rd	9/35	25.7	7/37	18.9	8/30	26.7
6th	11/23	47.8	3/20	15	5/14	35.7
9th	4/26	15.4	3/24	12.5	3/27	11.1
11th	30/65	46.1	3/51	5.9	10/53	18.8
Grand Total	54/149	36.2	16/132	12.0	26/124	21

Among the sixth graders, however, significantly more subjects changed their preference in the HSD-LSA than in the LSD-HSA condition ($\chi^2 = 5.24$, $p < .05$, 1 *df*). While differing significantly from each other, frequency of change in neither of these conditions differed significantly from that in the control group.

The number of subjects among the ninth graders who changed their preferences was, unexpectedly, very similar to that at the third grade level, there being no significant difference between source effects in a comparison of the experimental groups with each other and against the control group.

But status of the source reappeared as an important variable at the eleventh grade. Here a significant difference did occur in the incidence of change between the two experimental groups ($\chi^2 = 23.12$, $p < .01$, 1 *df*), and each experimental group differed significantly from the control group (χ^2 for HSD-LSA $= 9.70$, $p < .01$, 1 *df*; and χ^2 for LSD-HSA $= 4.03$, $p < .05$, 1 *df*).

The unexpected similarity of change behavior of the ninth graders to that of the third graders could be due to two general factors: less general susceptibility to peer influences of the ninth graders as a consequence of their developmental stage or to a less well defined group formation among them. The latter possibility would appear the more probable, however, since most of the subjects at the sixth and eleventh grade levels had been in school and in the same classes together for several years, a condition favoring evolvement of more stabilized status and role positions. Many of the ninth graders, on the other hand, were in school and class together for the first time, having entered high school from different elementary schools only five months before.

It should be pointed out that this explanation is not directly deducible from the sociometric results. From these, the group delineation among the ninth graders appeared as clear as that among the other grade levels. Yet this could well be an artifact of the sociometric measurement, stemming from the instructions to the subjects to limit their choices to members of the present classes. This limited choice situation could easily have led to an individual's ranking high another person who in reality had far less psychological significance for him than order of the choice might suggest.

Sex and Influencibility

From the results in Table 2, it can be seen that the tendency toward greater effectiveness of the high status source is more pronounced among the girls than among the boys from the third through the ninth grades. This picture is reversed, however, in the eleventh grade, the influence of the high status member being greater here for the boys than for the girls. These differences between sexes in frequency of change were not significant at any grade level, but the shift at the eleventh grade level to greater influence among the boys was significant ($\chi^2 = 31.19$, $p < .001$, 6 *df*).

TABLE 2

SEX DIFFERENCES IN PREFERENCE CHANGES IN EXPERIMENTAL AND CONTROL CONDITIONS

	HSD-LSA		LSD-HSA		CONTROL	
	MALE $N=76$	FEMALE $N=73$	MALE $N=59$	FEMALE $N=73$	MALE $N=57$	FEMALE $N=67$
Grade	*Prop.* %	*Prop.* %	*Prop.* %	*Prop.* %	*Prop.* %	*Prop.* %
3rd	3/20 15	5/15 33.2	6/18 33.3	1/19 5.3	4/18 22.2	3/12 25
6th	3/10 30	8/13 61.5	2/9 22.2	1/11 9.9	2/6 33.3	3/8 37.5
9th	1/8 12.5	4/18 22.2	2/7 28.6	1/17 5.9	1/12 8.3	3/15 20
11th	21/38 55.3	9/27 33.3	1/25 4.0	2/26 7.7	5/21 23.8	6/32 18.8
Total	28/76 36.8	26/73 35.6	11/59 18.6	5/73 6.8	12/57 21	15/67 22.4

Popularity and Status in Susceptibility to Influence

It was felt that the wide variation in group definitiveness and age levels among the informal groups utilized in this study would render rather meaningless attempts at relating specific status and popularity positions to conformity. Accordingly, subjects were divided only into upper and lower halves on the status and popularity dimensions, and the difference in frequency of preference change between these two segments was ascertained. Only subjects in the HSD-LSA condition were included in this analysis due to the low frequency of change in the LSD-HSA condition.

Using the median test, popularity was found not to relate to influencibility. Status, on the other hand, was related negatively to susceptibility to influence, with significantly more changers being found among the lower than the higher status subjects ($\chi^2 = 3.93$, $p < .05$, 1 df).

Relationship between Status and Popularity

This measure was obtained by a correlation between the total scores derived from the popularity and leadership criteria in the sociometric questionnaires. Responses to three questions in each of the areas of popularity and status were included. Total scores were derived by weighting received choices in the reverse order of the preference. Weights for first, second, third, fourth, fifth, and above order of choices were 5, 4, 3, 2, and 1, respectively. The sum of all the choices received by an individual multiplied by the appropriate weights represented his total score in popularity or status.

The degree of correlation between status and popularity was, respectively, for the third, sixth, ninth, and eleventh grade levels: .74, .82, .78, and .79, all significant at less than the .001 level. The differences between these values are not significant for any grade levels. It would appear from this that by the time individuals reach the age of the third graders they differentiate between their friends and leaders in relation to every day life activities to the same general extent as do the older adolescents.

Summary

This study was concerned primarily with three questions having to do with patterns of influence in the small informal groups at differing age levels: (a) the differential influence of the highest and lowest status member on the opinions of other group members; (b) the relationship of an individual's status in the group to his own influencibility; and (c) the relationship between status or effective initiative and popularity at different ages.

The subject first indicated his preference for one of two pictures taken from the Meier Art Judgment Test. After a communication, he again indicated his choice of the picture, along with his preference on four other pairs of noncritical pictures. The communication always presented the highest and lowest status members as having chosen opposite pictures of the critical pair. This meant that in one experimental condition (HSD-LSA)

the leader was presented as having disagreed with the subject's earlier choice while the low status man was depicted as having agreed. In the other condition (LSD-HSA) the lowest status man was represented as having disagreed and the highest status man as having agreed with the subject's precommunication choice.

A total of 405 students from the third, sixth, ninth, and eleventh grades served as subjects in the two experimental and control conditions.

The number of individuals changing their prefernce in the HSD-LSA condition across age levels was significantly greater than in the LSD-HSA and control groups, while the incidence of changers in the LSD-HSA was significantly less than in the control group. The over-all net effect of simultaneous contradiction by the leader and support by the lowest status man was a tendency to shift toward the leader. And, conversely, support by the leader coincident with disagreement by the lowest status members tended to reinforce the individual's initial preference.

At the third and ninth grade levels status of the sources did not significantly affect preference changes. Among the sixth and eleventh graders, however, significantly more subjects changed their preferences in the HSD-LSA than in the LSD-HSA condition. And at the eleventh grade the number of changers in both experimental conditions differed significantly from the control group with more changes for the HSD-LSA condition and fewer changes in the LSD-HSA condition.

Popularity did not relate to influencibility; status related negatively, but only at the .05 level.

The degree of correlation between status and popularity, as derived from sociometric questionnaires, was, respectively, for the third, sixth, ninth, and eleventh graders: .74, .82, .78, and .79, with no significant differences among any of these values.

References

1. Dittes, J. E., & Kelley, H. H. Effects of different conditions of acceptance upon conformity to group norms. *J. abnorm. soc. Psychol.*, 1956, 53, 100-107.
2. Hochbaum, G. M. The relation between group members self confidence and their reactions to group pressures to conformity. *Amer. sociol. Rev.*, 1954, 19, 678-687.
3. Hovland, C. I., Janis, I., & Kelley, H. H. *Communication and persuasion.* New Haven: Yale Univer. Press, 1953.
4. Kelley, H. H. Communication in experimentally created hierarchies. *Hum. Relat.*, 1951, 4, 39-56.
5. Thrasher, F. M. *The gang.* Chicago: Univer. of Chicago Press, 1927.
6. Whyte, W. F. *Street corner society.* Chicago: Univer. of Chicago Press, 1943.

FAMILY SOCIOECONOMIC STATUS AND ADOLESCENT ATTITUDES TO AUTHORITY

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This study explores the relationships between several indices of family socioeconomic status and adolescents' attitudes to authority in some common social contexts—in the home, in school, and with their friends. The emphasis here is not upon behavioral conformity or rebellion but, rather, upon the degree to which the adolescent—on a phenomenological level—accepts or rejects the rules and regulations set for him in a given situation. The hypotheses to be evaluated are very general ones: that the socioeconomic status of the family plays some part in determining the degree of conformity experienced by an adolescent and that the various components of this social status differ in the extent of their effects upon his attitudes to authority. While the specific nature of these effects—and their mediation—remains an active and current research question, there is consensus on the general statement that social classes in the United States differ in their characteristic socialization values and practices and, in turn, that children exhibit corresponding differences in their attitudes and behaviors (*see* recent review by Bronfenbrenner, 2).

There is little previous work specifically relevant to the present question and the two most informative studies are not in agreement. Dimock (3) reports no significant relationship between adolescents' degree of *felt* emancipation from parents and the socioeconomic status of their families. Psathas (11) finds, two decades later, that on three of four dimensions of "independence" the social class of the family is a significant correlate: the lower the social class, the more independence the adolescent *perceives* himself to have in the form of his parents' permissiveness towards him and their respect for his judgment. The apparent contradiction between the two studies may not demand reconciliation since they differ in their samples: Dimock studied boys only; Psathas, while including the two sexes, failed to differentiate between boys' and girls' reports in his data analyses. Since cultural role expectancies and socialization emphases clearly differ for the sexes

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(and these differences may show rather complex interactions with social class), comparison of the results from these two studies becomes difficult.

Furthermore, both studies are only of limited import to our problem since they are based solely on questionnaire data. In the present study the adolescent's self-characterization, gained from an intensive personal interview, is supplemented with evaluations of his behavior in a variety of situations in order to arrive at an inference concerning his underlying attitudes to authority. These attitudes are related, separately for boys and girls, to indices of the family social class at three age levels (14, 15, and 16 years) and in three interpersonal situations (at Home, in School, and with Peers).

Method

Sample

The sample used is a subsample of the Guidance Study group at the Institute of Human Development at the University of California in Berkeley (7). The Guidance Study has been concerned with the investigation of the physical, mental, and personality development of a group of normal children. Observations of these children began at the age of 21 months and continued up to age 18. All of the subjects, serially selected from the birth certificate registry of Berkeley (an urban community in the San Francisco metropolitan area), were born in the years 1928 and 1929.

The Guidance Study group was, at the time that study began, a fair sampling of the Berkeley population but differed from the general United States urban population in respect to a lower rate of infant mortality, higher educational level, higher occupational level, higher percentage of home-owners, better household facilities, lower percentage of foreign-born parents, more Protestants and fewer Catholics and Jews, and, because they were young childbearing families, they had a lower per capita income.

A "core" group of 19 boys and 29 girls was selected from the total Guidance Study population as the sample for this study in order to permit study of changes over time for the same group of individuals. This "core" group comprises *all* the subjects available from the Guidance Study group for whom there were complete ratings of attitude to authority in all three of the interpersonal situations and at each of the three ages. In this total subsample of 48 families, 87 per cent of fathers and 83 per cent of mothers are native born; 81 per cent and 77 per cent, respectively, are Protestant. It should be noted that the children were reared during the depression years and that their adolescence, here under study, coincides with the span of World War II.

Measures

Measures of conformity. Each adolescent was rated on his attitude to authority in three situations (at Home, in School, and with his Peers) at ages 14, 15, and 16. These ratings were based upon a clinical evaluation

of all information available on a child for a given situation at each age level. The sources of data included interviews with the adolescent and with his mother and, also, teacher ratings and sociometric appraisals from his school. The same five-point rating scale was employed for the three situations:

5. Hectic drive to conform.
4. Real urge to conform, to be accepted, to avoid friction, etc.
3. Occasional assertions of individuality but for the most part accepts rules, regulations, social standards without much wear and tear.
2. Tries to side-step rules and regulations to avoid conformity. Passive resistance or avoidance of situations where rules or regulations would have to be met.
1. Extremely resistive to rules, regulations, and authority. Extreme individualism and nonconformity.

Measures of socioeconomic status. A number of socioeconomic indices available for Guidance Study families permitted the assessment of the relationships between an adolescent's conformity patterns and the socioeconomic level of his family *at the time of his birth.* An over-all measurement is provided by the California Institute of Child Welfare Index which is composed of a number of socioeconomic indices (selected by H. E. Jones). It combines four elements: (a) Berkeley Social Rating Scale (to be denoted by BSRS), which covers house exterior, neighborhood, family accommodation, living room, and special equipment; (b) total family income; (c) midparent education; and (d) occupation of father. This composite index (SES) has been shown by Atherton (1) to relate highly in the Guidance Study sample to several other socioeconomic indices, among them the Warner Index of Status Characteristics (12) with which it correlates .85. This general measure is supplemented by two additional scores intended to differentiate socioeconomic status into its "social" and "economic" components. Such a distinction seems logically tenable and is supported by the results of a factor-analytic study of all socioeconomic indices available in the Guidance Study (1). In this report it is found that, although a single factor may account for the bulk of covariance among 18 individual indices, it is possible to discern two empirical clusters of indices which generally separate educational and occupational items from more directly income-related items. The best measures of the former ("social") cluster are mothers' and fathers' educational level (years of schooling); for the latter ("economic") cluster the best single measurement is provided by the previously mentioned BSRS.

As can be read from Table 1, the educational level of each parent is highly related to BSRS, and all three variables show substantial correlations with SES. The median value is above .70, and all correlations are significant at the 1 per cent level or better. In view of the considerable intercorrelation of these three measures, the legitimacy of distinguishing among them depends upon their ability to yield differential correlations with the measures of attitudes toward authority.

TABLE 1

INTERCORRELATIONS AMONG FOUR SOCIOECONOMIC INDICES
($N = 48$)

			Education	
	SES	*BSRS*	*Mother*	*Father*
Socioeconomic Composite (SES)	—			
Berkeley Social Rating Scale (BSRS)	.80**	—		
Mothers' Education	.81**	.49**	—	
Fathers' Education	.71**	.35*	.70**	—

* Significant at the .01 level.
** Significant at the .001 level.

RESULTS AND DISCUSSION

Table 2 summarizes the distributions for the three conformity ratings at each of the three age levels for boys and girls separately.

TABLE 2

MEANS AND STANDARD DEVIATIONS OF RATINGS OF CONFORMITY AT HOME, SCHOOL, AND WITH PEERS AT AGES 14, 15, AND 16*
(19 Boys, 29 Girls)

	Boys		Girls		*Sex Difference in Means*
Age	*Mean*	*SD*	*Mean*	*SD*	
Attitude to Authority in Home:					
14 years	3.05	.69	2.97	.49	—.08
15 years	2.95	.69	3.07	.58	.12
16 years	3.16	.93	3.17	.59	.01
Mean	3.05	.77	3.07	.55	.02
Attitude to Authority in School:					
14 years	3.32	.80	3.14	.57	—.18
15 years	3.32	.65	3.31	.70	—.01
16 years	3.11	.72	3.38	.61	.27
Mean	3.25	.72	3.28	.63	.03
Attitude to Authority with Peers:					
14 years	3.21	.69	3.24	.57	.03
15 years	3.26	.64	3.48	.81	.22
16 years	3.05	.69	3.55	.62	.50†
Mean	3.17	.67	3.26	.67	.09
Grand Mean	3.16	.72	3.26	.62	.10

* Above 3, conforming side of rating scale; below 3, nonconforming side.
† Significant at the .01 level by t test.

Although girls show higher conformity than boys in seven out of nine comparisons, only one significant sex difference is found (age 16, Peers, $p < .01$). However, girls show a consistent tendency to increase their degree of conformity from ages 14 to 15 to 16 in all three situations, while boys show no clear age trend, except perhaps the suggestion that in School and with Peers they become somewhat less conforming during the age span studied. Figure 1 illustrates these age trends. We may speculate whether these reverse trends for boys and girls in conforming behavior in School and with Peers may reflect differential cultural training and values and/or the effects of differing levels and rates of physical maturation for the two sexes. Whatever the pattern of determination, there is the suggestion that, within this age range, boys are beginning to assume their "traditional" leadership and decision-making roles and girls to adopt the more conforming patterns of behavior for which they tend to be rewarded in our society.

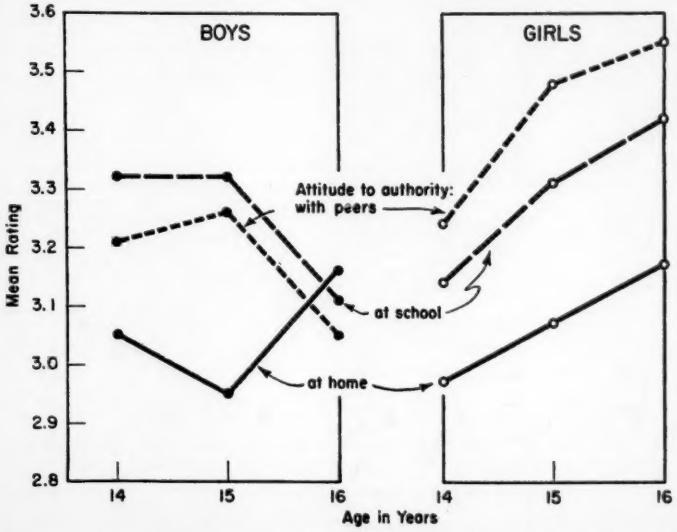

FIGURE 1—Mean ratings of degree of conformity in three situations as a function of age.

The average ratings for both boys and girls over the three-year period fall consistently on the conformity side (above 3.0) of our scale (*see* Table 2). The grand means over the three age levels are 3.16 and 3.26 for boys and girls respectively. The distributions of ratings are generally skewed and, in a frequency distribution of all ratings, 33 per cent of adolescents are rated "4" or "5" and only 12 per cent receive ratings of "2" or "1." Over

the three-year period there seems to be a considerable degree of instability in the attitude to authority in each situation. Interage correlations for boys (among the three ages over the three situations) range from .21 to .68 with a median correlation of .59. For girls, the range is .25 to .61 with a median of .43. It is possible, of course, that these low interage correlations are primarily reflections of low reliability in the ratings of conformity. However, an additional breakdown of the scores questions this interpretation: there are more changes in degree of conformity recorded for adjacent ages when the same person was responsible for both ratings than when different raters provided the data. This analysis argues that we may regard the interage correlational data as indicating that adolescent boys and girls undergo considerable fluctuations in their degree of conformity, a characteristic quite compatible with the view that the establishment of personal autonomy is a focal and wavering struggle of the adolescent period.

TABLE 3

INTERCORRELATIONS AMONG RATINGS OF CONFORMITY IN THE HOME, SCHOOL, AND PEER SITUATIONS
(19 Boys, 29 Girls)

	Age 14			Age 15			Age 16		
	Home	*Sch.*	*Peer*	*Home*	*Sch.*	*Peer*	*Home*	*Sch.*	*Peer*
Boys:									
Home		.64	.53		.74	.51		.84	.73
School			.83			.56			.74
Girls:									
Home		.51	.53		.62	.44*		.58	.59
School			.86			.77			.63

* Only this correlation does *not* reach the .05 level of significance.

The interrelationships among the measures of conformity in the three situations provide a necessary background for understanding whatever differential correlation with SES variable they may show. In their own right these interrelationships permit certain inferences concerning the situational generality of conforming behavior. At age 14 both boys and girls tend to show the same degree of conformity in School and with Peers, with the Home situation evoking more unique behavior. The tendency to show quite different attitudes toward authority in the home than outside of it is less at age 15 than at age 14 and is no longer apparent in either sex by age 16. This age change in the meaning of the Home situation, however, may be attributable to apparently opposite trends for boys and girls: for the boys, age 16 marks a period of greatly increased generality in conforming behavior; for girls, the three situations have become relatively differentiated from one another with respect to the authority attitudes they evoke.

Conformity in Relation to Socioeconomic Indices

Socioeconomic Composite (SES). Exploring the relationships between conformity of the adolescent to authority pressures at Home, in School, and with Peers and the SES of his family, we find that for boys these relationships are consistently negative (*see* Table 4). However, only two of the nine negative relationships are significant at the 5 per cent level. In contrast, there are no significant relationships between the girls' conformity and SES, nor are these relationships consistent in direction.

TABLE 4

CORRELATIONS BETWEEN SOCIOECONOMIC STATUS COMPOSITE (SES) AND CONFORMITY IN HOME, SCHOOL, AND PEER GROUPS

	N	Attitude to Authority in *Home*			*School*			*Peers*		
		14 yrs.	15 yrs.	16 yrs.	14 yrs.	15 yrs.	16 yrs.	14 yrs.	15 yrs.	16 yrs.
Boys	19	−.22	−.51*	−.38	−.38	−.42	−.33	−.37	−.44	−.51*
Girls	29	.22	.18	−.25	.26	−.02	.19	.24	−.04	.10
Significance of Sex Difference		*ns*	.02	*ns*	.04	*ns*	*ns*	.05	*ns*	.04

* Significant at the .05 level.

Evaluating the sex differences in these relationships, we find that in four of the nine comparisons the differences are significant at or beyond the 5 per cent level. It seems fair to suggest from these data that, the lower the SES of his family, the more compliant will be the boy to authority whether it occurs in the home, in school, or in the "outside" world in general. However, before attempting an interpretation of this phenomenon on the basis of the SES composite factor alone, we will proceed to explore the relationship of conformity to its more purely "economic" and more purely "social" components.

The Berkeley Social Rating Scale (BSRS). As Table 5 shows, correlations between ratings of the family on the BSRS and the adolescent's degree of conformity remain consistently negative for boys with but a single exception; however, only one correlation achieves significance. In the case of the girls there are no significant correlations and, since the relationships fluctuate in direction, no general trend can be detected. Furthermore, there are no significant sex differences in these relationships. Since the "economic" component of the SES composite shows such low relationships, we are encouraged to expect that the "social" component (i.e., parental education) will prove more predictive.

TABLE 5

CORRELATIONS BETWEEN BERKELEY SOCIAL RATING SCALE (BSRS) AND CONFORMITY IN HOME, SCHOOL, AND PEER GROUPS

	N	Attitude to Authority in Home			School			Peers		
		14 yrs.	15 yrs.	16 yrs.	14 yrs.	15 yrs.	16 yrs.	14 yrs.	15 yrs.	16 yrs.
Boys	19	.01	−.14	−.26	−.10	−.04	−.23	−.11	−.08	−.46*
Girls	29	.08	.16	−.12	.12	−.02	.13	.07	.00	.09
Significance of Sex Difference		*ns*	*ns*	*ns*	*ns*	*ns*	*ns*	*ns*	*ns*	.07

* Significant at the .05 level.

Parents' Education in Relation to Conformity

The parents' education ranges from 5 to 19 years of schooling for both fathers and mothers. The mean score for mothers is 11.8 with a standard deviation of 3.4 years; for fathers the mean value is 12.1, the standard deviation is 3.7.

The relationships between parents' education and adolescents' attitudes to authority reproduce, but in a much more clear-cut fashion, those found with the SES scale. For boys, of the nine correlations with mothers' educa-

TABLE 6

CORRELATIONS BETWEEN PARENTS' EDUCATION AND CONFORMITY IN HOME, SCHOOL, AND PEER GROUP

	N	Attitude to Authority in Home			School			Peers		
		14 yrs.	15 yrs.	16 yrs.	14 yrs.	15 yrs.	16 yrs.	14 yrs.	15 yrs.	16 yrs.
Mothers' Education:										
Boys ..	19	−.24	−.65**	−.49*	−.63**	−.55*	−.50*	−.65**	−.55*	−.58**
Girls ..	29	.32	.16	−.20	.17	.03	.17	.07	−.18	.18
Significance of Sex Difference		.08	.004	*ns*	.01	.05	.03	.01	*ns*	.01
Fathers' Education:										
Boys ..	19	−.29	−.58**	−.36	−.46*	−.54*	−.26	−.43	−.59**	−.37
Girls ..	29	.28	.15	−.08	.10	−.01	.20	.29	−.16	.24
Significance of Sex Difference		.08	.01	*ns*	.07	.07	*ns*	.02	*ns*	.05

* Significant at the .05 level.
** Significant at the .01 level.

tion, all are significant beyond the 5 per cent level, and four of these beyond the 1 per cent level. All are negative. With fathers' education, boys' attitudes to authority show consistently negative relationships, four of these significant at the 5 per cent level (two at the 1 per cent level). In comparison with the corresponding SES correlations, mothers' education always indicates a stronger negative relationship while fathers' education is, in general, also a better predictor of attitude to authority than is the SES composite.[2]

In contrast with boys, there are no significant relationships between either of the parental education indices and the girls' attitudes to authority.

The data clearly admit the conclusion that an inverse relationship exists between boys' degree of conformity and the socioeconomic level of their familes and that this relationship most clearly resides in the "social," rather than in the "economic," component of social status.[3] There are a number of ways in which we may account for this general finding, and it is doubtful whether any single mediating hypothesis can encompass the full range of linkages between class and conformity which occur in the present sample. Also, although we have implicitly regarded the socioeconomic indices as continuous variables (by employing correlational analyses), the concept of social classes or strata argues for the existence of discontinuities along socioeconomic dimensions. Thus, an hypothesis put forward to account for high conformity in boys from somewhat lower social positions does not necessarily find its polar opposite in—and may even be irrelevant to—the determinants of less conformity in relatively higher classes. In this instance our sample of boys is essentially middle class (14 of the 19 families are so designated by the Warner classification; the remaining 5 boys come from upper-lower families) so that the relationships reported here largely reflect comparisons between upper-middle and lower-middle homes.

In lower-middle families we suggest that parents are more likely to imbue their sons with the importance of "respectable" behavior and also with a greater acceptance of their social status—and thus of authority. Upper-middle families, by contrast, may be more likely to value an improvement in their social positions and to implement these strivings through

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[2] Similarly, in the total samples of boys available at ages 14, 15, and 16 (with *N*s of 42, 38, and 29, respectively) the correlations of conformity with mothers' education are consistently negative but somewhat lower. Six of the nine correlations are significant at the .05 level or better; their range is from −.06 to −.49, with a median of −.40. Failure to be included in the "core" group (which required presence of ratings in each situation at all three ages) was due to the boy having moved from the community, missed appointments, inadequate information on which to base a rating, or omission of this set of ratings from the interview schedule at a given year. These factors resulted in generally *lower* standard deviations for the total groups, as compared to the "core" group, which may in part account for the attenuation of the correlations.

[3] As would be expected from the correlations with parental education, the intelligence level of the adolescent boys tends to be negatively related to their degree of conformity. However, none of the correlations of IQ (Stanford-Binet, age 15) with conformity in the three situations at the three age levels reach the .05 level of significance.

the manner in which they raise their children. Recalling the specific context for this investigation, it is not difficult to attribute to a highly-educated, upper-middle class mother in the 1940's a striving for upward mobility which, in part, is manifested in a need to insure, through her childrearing "philosophy" and practices, that her son achieves highly in school, in status among his peers, and in his future vocation. Under such compelling pressures reactions of both greater independence and rebellion in her son are predictable.

The formulations for boys' conformity gain some support from the literature on social class differences in parental values and practices. However, such data are notorious for their dependence upon the particular temporal and subcultural contexts in which they were gathered so that their relevance to the present findings, which themselves are tied to an atypical social period, is at best tangential. Nevertheless, we are encouraged by Duvall's (4) conclusion that working-class mothers, more than those from the middle class, stress the importance of children's obedience to their parents—and to adults in general. These data were obtained in 1943-1944, a period coinciding with our own observations. More recently, Kohn reported that ". . . middle-class parents (fathers as well as mothers) are more likely to ascribe predominant importance to the child's acting on the basis of internal standards of conduct, working-class parents to the child's compliance with parental authority" (6, p. 341). Specifically, he reports that such traits as self-control, dependability, independence, and curiosity are more valued by middle-class parents, while working-class children are more often expected by their parents to be neat, clean, and obedient. These differences hold up for breakdowns based on mothers' education, even within social classes. Coupling these observations with Bronfenbrenner's (2) general conclusion, based upon an intensive review of studies in this area, that, in the period 1943-1953, middle-class mothers have had higher expectations for achievement for their children than did working-class mothers, we can draw some support for our interpretations of the relationship of social class variables (and particularly mothers' education) with the degree of independence shown by adolescent boys. If, indeed, more highly educated mothers are more likely to combine pressures for independence and achievement and mothers with less education to stress compliance with adult authority, then our results for boys become comprehensible.

However, since much the same class differentials in parental expectations have been found for girls, the riddle posed by their failure to show class-related variation in attitudes to authority is intensified. We can only suggest, as one contributing factor, that the expectation in the larger culture of greater conformity in girls may be equally implemented in families along the full socioeconomic range (or, at least, throughout the middle class). This is not to argue that the intentions of socialization for girls do not vary with social class; the higher-status families may be training for social poise, while lower-status families may—as we suggested for boys—value "respec-

tability" in their daughters. We must seek elsewhere for the determinants of individual variations in conformity among girls.

Composite socioeconomic status, as measured by SES, is by itself a good predictor of boys' attitudes to authority, but more powerful indicators are the educational levels of the parents, particularly mothers' education. This is in line with the above hypotheses which assume that the mother is the primary agent mediating social class and boys' behavior. That the economic level shows such low relationships with the degree of conformity may be due to the fact that the sample has a relatively restricted socioeconomic range. Furthermore, the impact of economic factors upon attitudes toward authority may not yet be manifest by age 16. Somewhat later, when the adolescent has faced more directly the restraints on his educational and occupational mobility due to his economic level, then these factors possibly will come to bear a relationship to his conformity.

One further analysis may be of interest. Throughout this report there has been little systematic variation attributable to chronological age, per se, which is not surprising in view of the overriding importance of differential maturity rates during this period. For boys especially, the adolescent years 14 to 16 represent a time of great disparity in physical characteristics relatable to growth rate. Since physiological maturation is reflected in changes in bodily functioning (and in one's perception of one's own body) as well as in changes in one's social stimulus value (being seen less as a child and more as an adult), we were encouraged to examine the interaction between maturation, social status, and the adolescent's attitudes toward authority.

Physiological maturity status was measured, both for boys and girls, by a general (first) factor score evolved from a factor-analytic study of the interrelationships among a large number of physical development indices obtained on Guidance Study children throughout its span (10). Dichotomizing on this factor score and on the socioeconomic composite (at their respective medians), four subgroups of boys were constituted: Early Maturing - High SES, Early Maturing - Low SES, Late Maturing - High SES, and Late Maturing - Low SES. While the sizes of these groups (5, 5, 5, and 4, respectively) precludes statistical tests of adequate power, one trend in their mean conformity scores is sufficiently consistent to merit mention: the Late Maturing - High SES boys are least conforming (or tied for lowest rank) in each of the nine possible intergroup comparisons (each situation at each age). We may speculate that the additional pressures for social achievement (which we postulated for higher SES homes) bear even more heavily upon the late-maturing boy who, in adolescence, is less well-equipped to meet the achievement standards set by his home and by his peer social groups. This isolated finding becomes more meaningful when considered in the context of some data on the personality correlates of maturation rate. Jones and Bayley (5) conclude, from their study of the relationships between maturational status and social behavior in adolescent boys, that late maturers exhibit ". . . a 'natural' or 'childish' expressiveness in the

earlier years of adolescence, and a more compensatory attention-seeking expressiveness in the later years" (p. 137). Working with the same sample, Mussen and Jones (8) report that late-maturing boys show ". . . strong feelings of being rejected and dominated, prolonged dependency needs, and rebellious attitudes towards parents" (p. 255). However, they also are rated higher than are early-maturing boys on the drive for social acceptance by their peer group with the qualification, in line with the earlier study, that ". . . the late maturer's high social drives . . . are often manifested in childish, affected, attention-getting social techniques" (9, p. 66). The gist of these findings suggests that the low conformity in School and with Peers of the Late Maturing - High SES boy in the present study may stem primarily from the behavioral unconventionality of the social techniques he employs in order to impress and win over his schoolmates and friends while, in the Home situation, low conformity denotes true rebellion against parents. The Late Maturing - Low SES boy, by contrast, is—on the average—the most conforming of the four groups. We may wonder whether this is due to a greater acceptance of, or resignation to, his physical retardation and whether, in turn, his conformity is an expediency made possible by the lesser achievement pressures of his lower-middle-class home.

Replicating this analysis for girls, for whom the effects of differential maturation should be less by this age due to their earlier maturation, we find only that Early Maturing - High SES girls are most conforming of the four groups in School and with Peers: at all three ages they show the highest mean ratings in these two situations. One possible interpretation is that more mature girls from High SES families accept earlier and more rapidly internalize the standards for "good" behavior put forward by their socially superior (and perhaps more socially striving) parents.

The suggestions arising from this additional analysis have, as is evident, only very fragile support from our data. At the very least, however, they do indicate the potential usefulness of regarding the adolescent's physical status as a relevant mediator of the effects of his family's social status and its accompanying values upon his attitudes toward authority, both in the home and in his social environment.

Summary

Attitudes to authority, ranging from conformity to rebelliousness, were evaluated in three interpersonal situations (at Home, in School, and with Peers) for the same sample of adolescent boys and girls at ages 14, 15, and 16 years. These inferential ratings, based on interviews with the subjects and their parents and on data provided by teachers and classmates, were analyzed for sex differences (a slight tendency toward greater acceptance of authority in girls), for generality among the three ratings at a given age (moderately positive intercorrelations), and for stability of a given attitude over the three age levels (considerable fluctuation).

Most striking is the consistently negative relationship between degree of conformity experienced by the male adolescent (in all situations and all ages) and the socioeconomic status of his family (measured separately by a composite index, by the Berkeley Social Rating Scale, and by mothers' and fathers' educational levels). No consistent trend is apparent for girls. Mothers' education is the single, most powerful predictor of boys' attitudes to authority, yielding significant negative correlations in eight of nine instances. There is a suggestion, for both sexes, of variation in degree of conformity relatable to an interaction between socioeconomic factors and the physical maturity level of the adolescent. The results are evaluated in the context of reported social class differences in parental values and practices and their corresponding socialization goals.

References

1. Atherton, Karyl. An exploratory analysis of some indices of socioeconomic status. Unpublished manuscript, Institute of Human Development, Univer. of California, Berkeley, 1958.
2. Bronfenbrenner, U. Socialization and social class through time and space. In Eleanor E. Maccoby *et al.* (Eds.), *Readings in social psychology*. New York: Holt, 1958.
3. Dimock, H. S. *The rediscovery of the adolescent.* New York: New York Association Press, 1937.
4. Duvall, Evelyn M. Conception of parenthood. *Amer. J. Sociol.*, 1946-1947, 52, 190-192.
5. Jones, Mary C., & Bayley, Nancy. Physical maturing among boys as related to behavior. *J. educ. Psychol.*, 1950, 41, 129-148.
6. Kohn, M. L. Social class and parental values. *Amer. J. Sociol.*, 1959, 64, 337-351.
7. Macfarlane, Jean W. Studies in child guidance: I. Methodology of data collection and organization. *Monogr. Soc. Res. Child Develpm.*, 1938, 3.
8. Mussen, P. H., & Jones, Mary C. Self-conceptions, motivations, and interpersonal attitudes of late- and early-maturing boys. *Child Develpm.*, 1957, 28, 243-256.
9. Mussen, P. H., & Jones, Mary C. The behavior-inferred motivations of late- and early-maturing boys. *Child Develpm.*, 1958, 29, 61-67.
10. Nicolson, Arline B., & Hanley, C. Indices of physical maturity: derivation and interrelationships. *Child Develpm.*, 1953, 24, 4-38.
11. Psathas, G. Ethnicity, social class, and adolescent independence. *Amer. social. Rev.*, 1957, 22, 415-423.
12. Warner, E. L., Meeker, Marchia, & Eells, S. K. *Social class in America.* Chicago: Science Research Associates, 1949.

THE PARENTAL ATTITUDES OF PARENTS OF CHILD GUIDANCE CASES: I. COMPARISONS WITH NORMALS, INVESTIGATIONS OF SOCIOECONOMIC AND FAMILY CONSTELLATION FACTORS, AND RELATIONS TO PARENTS' REACTIONS TO THE CLINICS[1]

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Shoben's (12) development of the University of Southern California Attitude Survey and his demonstration of its ability to differentiate mothers of problem children and nonproblem children have stimulated interest in parental attitude scales during the last 10 years. This interest is quite understandable, for an objective, easily administered, and valid instrument measuring parental attitudes would be of considerable value in the exploration of the environmental backgrounds of the behavior disorders. Mark's (7) differentiation of a group of mothers of schizophrenics and control mothers using a parental attitude scale provided another stimulus to work in this area. The Parental Attitude Research Instrument (PARI), developed by Schaefer and Bell (10), utilized a number of small but cohesive scales measuring specific sorts of parental attitudes. Such a test seemed particularly valuable since it could pinpoint more precisely the particular attitudes characterizing a group of mothers. However, there have been some ominous notes sounded in the last few years. Crandall and Preston

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(2) found little relationship between mothers' self-ratings on the Fels Scale and ratings made by persons observing them. Gordon (3) found no relation between Shoben's scales and ratings of mothers made by the professional staff of a clinic after a 12-day observation period. Leyton (6) found no difference on the Shoben scales between mothers and fathers whose children had been rated by teachers at the two extremes of a six-point scale of adjustment. McFarland[2] failed to replicate Mark's findings on the mothers of schizophrenics. Zuckerman, Oltean, and Monashkin (16) failed to find a difference between mothers of schizophrenics and controls using the Parental Attitude Research Instrument (although there was a significant interaction between these groups and levels of mother's education).

While some positive studies have also been reported, there seems to be a growing suspicion that parents' verbal descriptions of their behavior and attitudes may be somewhat discrepant from their actual behavior and attitudes. The suspicions of the senior author were aroused by the outcome of a study (unpublished) conducted a year ago. Parents of 26 children in a nursery school were sent copies of the PARI after obtaining their consent by telephone. Two teachers made ratings of the children's over-all adjustment in nursery school, along with more specific behavioral ratings. The first interesting finding was that the mothers of the most maladjusted children did not return the PARI forms after a reasonable period of time. Chi square for return-nonreturn vs. high-low in adjustment of child was significant. Later, after repeated appeals, all except three parents returned the forms. The children of these three parents were among the five most maladjusted in the group. One of the parents, after finally refusing outright to take the test, generously offered to let her maid fill it out as a substitute. The results suggested that the test is particularly threatening to parents whose children are most disturbed. Significant correlations were found between the child's maladjustment and the PARI scores for five of the mothers' scales and six of the fathers' scales. However, all of these correlations were positive, i.e., the parents of maladjusted children tending to score on the low or permissive end of the scales rather than on the high end! The reliability of the results was considered dubious, and interpretation was deferred pending outcome of the larger clinic study reported in this paper.

Previous studies have indicated that the mother's age and education and the number of children in the family may influence PARI scores. The mother's educational level correlated significantly ($p < .01$) with 18 of the 23 PARI scales in a normative group (17), with an Authoritarian-Control factor score (a sum of 16 scales) in mothers of adult schizophrenics (16) and with the same factor score in female psychiatric patients (15). Mother's age, in the normative sample (17), correlated significantly ($p < .01$) with six of the scales, and the significance level of four other correlations fell between the .05 and .01 levels. Six of the correlations between scales

[2] Personal communication, 1957.

and the number of children, in the same sample, fell between the .05 and .01 levels of significance. In almost all cases the less educated, older mothers with more children had the more authoritarian, controlling parental attitude scores.

A common problem in child guidance clinics is lack of parental cooperation, which is often manifested in defection during or after the evaluation period. Levitt has investigated the problem of parental defection from the standpoint of reasons given by the parents (5) and case history variables related to defection (4). In the latter study, 61 variables were related to defection, and only five of them were found to relate at a significant level. If parental attitude scales could predict noncooperativeness of the parents, they would be extremely useful in the practical clinic setting.

The purpose of this study was to relate parental attitude scores to five major categories of variables including: Diagnosis, Age, Socioeconomic Status (education and occupation), Family Constellation, and Cooperativeness with the Clinic. Each of these will be discussed further in the Procedure and Results sections.

Method and Procedure

Parental Attitude Measures

The data in this study were obtained using the mother's and father's forms of the PARI. The mother's form of this test has been factor analyzed by Schaefer and Bell (9), who used a sample of unmarried student nurses, and by Zuckerman, Ribback, Monashkin, and Norton (17), who used mothers of normal and disturbed children. Three factor scores were derived from the latter analysis: factor A includes 16 of the individual scales and is labeled "Authoritarian-Control"; factor B includes three of the subscales and is labeled "Hostility-Rejection"; factor C includes three positively worded scales and is labeled "Democratic Attitudes." Correlations between personality measures and the factor scores indicated some degree of construct validity for them (15). However, it appears that these factor scores are markedly influenced by Acquiescence and Extremes response sets (14). Reversed scales which were developed to control and measure these sets (13) were not available at the time of the current study.

Most of the analyses reported in this paper deal with the scores on factors A and B. Items comprising factor C were not used because they are so stated that most people agree with them. In some cases individual scales are reported in the text without tabulation. In evaluating these differences the reader must remember that 23 scales were analyzed for mothers and 25 scales for fathers. Considering the number of comparisons, one might expect one or two significant differences by chance for either mothers or fathers. In cases where only a few scales were significant (significance was set at the .05 level, two-tailed test) one must assume these were due to chance unless the findings can be replicated.

Subjects

The subjects were 165 mothers and 140 fathers of child patients evaluated in two child guidance clinics and 181 mothers and 36 fathers from a normative sample described in a previous article (17). The *N*s for comparisons using the clinic group vary because of the particular comparison or missing case history data relevant to the comparison.

The mean age of mothers in the clinic group was 35.9; that for the normative group was 37.5. The difference between these means was not significant. The average educational level for the clinic group of mothers was 11.3; the same average for the normal group was 12.5. This difference was significant with a greater proportion of the normative group drawn from the higher educational levels. In order to control education in the comparisons between these two groups, the mothers in each of the groups were assigned to one of three educational levels: less than four years of high school, high school graduate, and one or more years of college. Means were obtained at each level of education within each group, and these means were weighted for both groups by the proportion of the population falling into each educational level according to the 1950 census. An over-all mean was obtained for each group using these weighted means, and the over-all means were compared.

Comparison of clinic and normative fathers was made by selecting a group of 36 fathers from the larger clinic group who fell into the educational and occupational range of the 36 fathers in the normative group. The mean age of the clinic fathers was 43.1, of the normative fathers, 43.3. The mean educational level for the clinic fathers was 12.4; the mean for the normative fathers was 13.1. Neither of these differences between means was significant.

Procedure

Most of the normative sample was tested in groups at meetings of various church social clubs. A smaller portion of the normal sample was obtained by PARIs sent home with students in a college extension course and PARIs mailed to parents of children in a nursery school. The clinic sample was obtained by sending the PARIs to the parents after they had applied for evaluation at the child guidance clinics. The PARIs were included with other forms requesting information and were represented as part of the clinic procedure. A special letter was enclosed giving the routine PARI instructions and requesting the parents to take the test in privacy without consulting anyone else. Separate envelopes for mothers and fathers were furnished, and they were instructed to seal their own PARI inside the envelope and return it to the clinic on the first clinic visit. It is not known to what extent the parents cooperated with these instructions. The differences in method of administration between the clinic and normal groups is probably the major qualification of the comparisons between the groups.

However, a more basic difficulty exists in any study comparing normals tested for "research purposes" and parents who know that they are being tested because their child is somehow deviant.

Case History Data

A psychologist at each of the clinics culled the case histories to obtain the relevant data for intraclinic comparisons. The information included the following:

1. Clinic diagnosis. This was usually assigned at a meeting of the clinic professional staff at which all relevant data on the child were considered.
2. General symptom type. This was the only categorization which required some judgment on the part of the psychologist gathering the data. He was required to classify the child's symptoms as (A) primarily "acting-out" symptoms, (B) predominantly "internalizing" (neurotic, anxious, obsessive, or habit disturbance) symptoms, (C) an equal mixture of A and B, (D) neither A nor B (e.g., purely a problem of mental deficiency). No reliability estimate could be made on these classifications. Since groups C and D contained most of the borderline judgments, they were not used in the comparisons.
3. Mother's education.
4. Husband's occupation.
5. Mother's age.
6. Age of the clinic child.
7. Number of children in the family.
8. Birth position of the clinic child.
9. Sex of the children in the family.
10. Sex of the clinic child.
11. Presence or absence of the father in the home.
12. (For one clinic) The interval between the initial contact with the clinic and receipt of the application form at the clinic.
13. (For one clinic) Whether or not the parent defected during the evaluation period.
14. (When treatment of child and/or parent was offered) Whether treatment was accepted or refused.

Results

A summary of the group comparisons on the two maternal attitude factor scores can be seen in Table 1.

Diagnostic Comparisons

Clinic mothers vs. normative mothers. The direction of the differences on both factor scores, though consistent with the results of the nursery school study, was contrary to theoretical expectation with the clinic mothers scoring lower (i.e., more permissive, less rejecting) than control mothers. However, the differences were not statistically significant. The clinic mothers did score significantly lower on four of the individual scales: Deification, Avoidance of Communication, Acceleration of Development, and Rejection of the Homemaking Role.

TABLE 1

GROUP COMPARISONS ON MATERNAL ATTITUDE FACTORS

Groups	N	M-Factor A Authoritarian-Control Score	F or t and df	p	M-Factor B Hostility-Rejection Score	F or t	p
Diagnostic							
1. *Groups:*							
Clinic Mothers	162	186.8	$t = 1.60$	*ns*	32.4	$t = 1.79$	*ns*
Normal Mothers	181	192.9	$df = 337$		33.7		
2. *Clinic diagnoses:*							
A. Adj. R., Conduct Dist., Sociopath	46	187.2			30.8		
B. Schizophrenic, Schizoid	12	194.1			34.5		
C. Neurotic, Pers. T.D., Spec. Sympt.	29	186.0	$F = .19$ $df = 3/129$	*ns*	32.9	$F = 1.55$	*ns*
D. Mental Deficiency	46	191.0			33.3		
3. *General symptom type:*							
Acting-Out	66	192.1	$t = .99$	*ns*	31.8	$t = .98$	*ns*
Internalizing	56	189.5	$df = 120$		32.6		
Socioeconomic							
1. *Mother's education (years):*							
0–8	27	224.4			32.4		
9–11	47	198.7			33.2		
12	59	177.3	$F = 16.34$	.001	31.9	$F < 1$	*ns*
13–14	14	168.0	$df = 4/157$		30.6		
15–20	15	160.4			34.2		
2. *Husband's occupation:*							
Professional, Semiprof.	40	169.7			33.3		
Trade, Clerical, Skilled	58	187.9	$F = 13.81$	.001	31.5	$F = 1.21$	*ns*
Semiskilled, Unskilled	42	207.6	$df = 2/137$		32.9		
Age							
1. *Mother's age (years):*							
29 and under	31	191.8			31.2		
30–34	45	184.6	$F = 3.81$	.05	32.6	$F = 1.35$	*ns*
35–39	33	162.6	$df = 4/154$		29.7		
40–44	31	198.7			33.1		
45 and over	19	192.4			33.6		
2. *Child's age (years):*							
3–7	56	188.1			33.2		
8–12	78	183.5	$F = 4.09$	.05	31.7	$F = 1.55$	*ns*
13 and over	29	206.5	$df = 2/160$		34.0		

(*table continued on next page*)

TABLE 1 (*continued*)

GROUP COMPARISONS ON MATERNAL ATTITUDE FACTORS

Groups	N	M-FACTOR A AUTHORITARIAN-CONTROL Score	F or t and df	p	M-FACTOR B HOSTILITY-REJECTION Score	F or t	p
Family Constellation							
1. *Number of children:*							
1	19	177.5			29.9		
2	57	182.8	$F = 2.81$	.05	31.4	$F = 2.37$	*ns*
3	42	187.0	$df = 3/161$		33.8		
4 or more	47	200.8			33.2		
2. *Birth position (clinic child):*							
Oldest	58	182.5			31.8		
Intermediate	49	198.1	$F = 2.39$	*ns*	34.3	$F = 2.00$	*ns*
Youngest	39	192.7	$df = 2/143$		32.6		
3. *Predominant sex of children in family:*							
Male	70	186.9	$t = 2.38$	.05	33.3	$t = 1.81$	*ns*
Female	52	202.9	$df = 120$		34.4		
4. *Sex of clinic child:*							
Male	111	185.5	$t = 1.84$	*ns*	32.4	$t = .69$	*ns*
Female	52	197.1	$df = 161$		33.1		
5. *Father absent or present:*							
Present	133	188.5	$t = .41$	*ns*	32.4	$t = .70$	*ns*
Absent	30	192.2	$df = 161$		33.4		
Cooperativeness with Clinic							
1. *Time between initial contact and application (days):*							
0–9	30	205.3			33.4		
10–19	23	186.7	$F = 1.80$	*ns*	32.8	$F = 2.47$	*ns*
20–59	12	179.4	$df = 3/74$		35.0		
60 or more	13	190.2			33.0		
2. *Cooperation in intake:*							
Cooperative	62	190.6	$t = .69$	*ns*	31.2	$t = 1.21$	*ns*
Withdrew	19	197.6	$df = 79$		33.2		
3. *Response to treatment offer:*							
Accepted	20	175.5	$t = 1.52$	*ns*	31.0	$t < 1$	*ns*
Refused	15	193.4	$df = 33$		31.6		

A second analysis was made of the individual scales using Bell's (1) conversion technique for PARI scores. Each subject's scale scores were converted to standard scores based on her own mean and standard deviation for the 23 scale scores. This technique partials out the differences in over-all profile elevation which may be due to acquiescence response set and/or a defensive test-taking attitude. Comparisons of clinic and normative mothers were made on these converted scale scores. Only three scales yielded significant differences. As in the previous analysis, the clinic group was significantly lower on Acceleration of Development and Rejection of the Homemaking Role. However, in this analysis, the clinic group was significantly higher on the scale, Seclusion of the Mother. Again, it must be remembered that one or two differences on individual scales might be expected by chance.

Clinic fathers vs. normal fathers. The clinic and normative fathers were compared on 25 of the scales from the fathers' form of the PARI. Only two scales yielded significant differences: the clinic fathers were significantly lower on Marital Conflict and Forcing Independence. Two differences out of 25 falls within the chance expectation range.

Diagnostic comparison within the clinical group. The diagnoses available on 134 children in the clinic group were grouped into four categories: (a) Adjustment Reaction, Conduct Disturbance, Sociopath; (b) Schizophrenic Reaction, Schizoid Personality; (c) Personality Trait Disorder, Psychoneurosis, Special Symptoms; (d) Mental Deficiency. The *F* ratios between mothers of the children in these diagnostic groups on the maternal attitude factors were not significant. Only one scale out of 23 yielded a significant difference for the mothers of the children in these groups: Rejection of the Homemaking Role. The mothers of schizophrenics and schizoids scored highest, and the mothers of adjustment reactions, conduct disturbances, and sociopaths scored lowest. Only one scale out of 25 yielded a significant *F* ratio for fathers: Nonpunishment. The fathers of schizophrenics and schizoids scored highest on this scale, while the other three groups were uniformly lower. Again the number of significant results falls within the chance expectation range.

General symptom types. The parents of children classified as primarily "acting-out" symptoms types were compared with the parents of children classified as primarily "internalizing" symptom types. The mothers of these two groups did not differ significantly on any of the PARI factors or scale scores. The fathers of the "internalizers" were significantly higher than the fathers of the "acting-out" group on only two scales: Nonpunishment and Expressing Affection.

Socioeconomic Comparisons

Maternal PARI factor scores were examined in relation to two socioeconomic factors, the education of the mother and the occupation of the father. Both of these factors were strongly related to the Authoritarian-

Control factor in maternal attitudes. The F for mother's education (five groups) was 16.34, significant below the .001 level. The nature of the relation can be seen in Figure 1. As education increases, maternal attitudes become less authoritarian and controlling. The F ratio for the Hostility-Rejection factor was not significant.

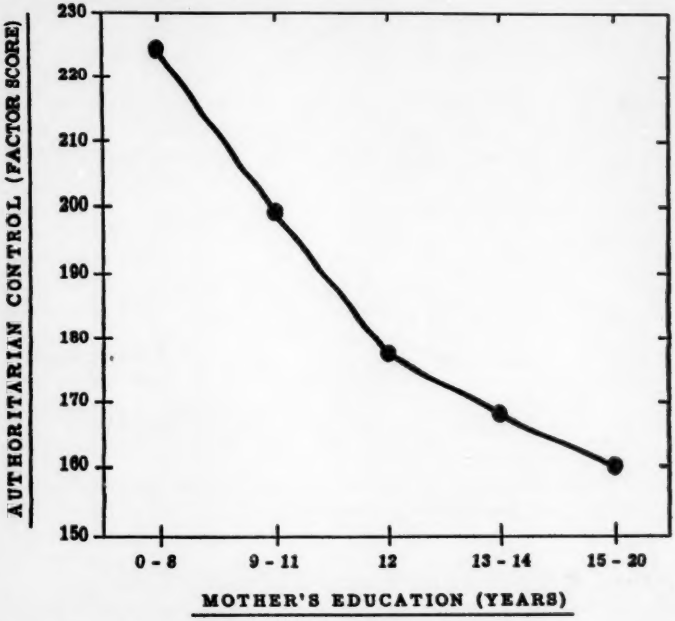

FIGURE 1—The relationship between mother's educational level and her Authoritarian-Control factor score.

Occupations were grouped into three levels: (a) Professional, Semiprofessional and Managerial; (b) Trade, Clerical, and Skilled; (c) Semiskilled and Unskilled. When clinic mothers were grouped according to husband's occupational level ($N = 140$), an F ratio of 13.81 obtained on the Authoritarian-Control factor was significant below the .001 level. This relationship is plotted in Figure 2. As occupational level of the husband increases, maternal attitudes become less authoritarian and controlling. The F ratio for factor B was not significant.

Age Comparisons

Mother's age. The F ratio for five age groups on the Authoritarian-Control factor was 3.81 which was significant below the .05 level. As can

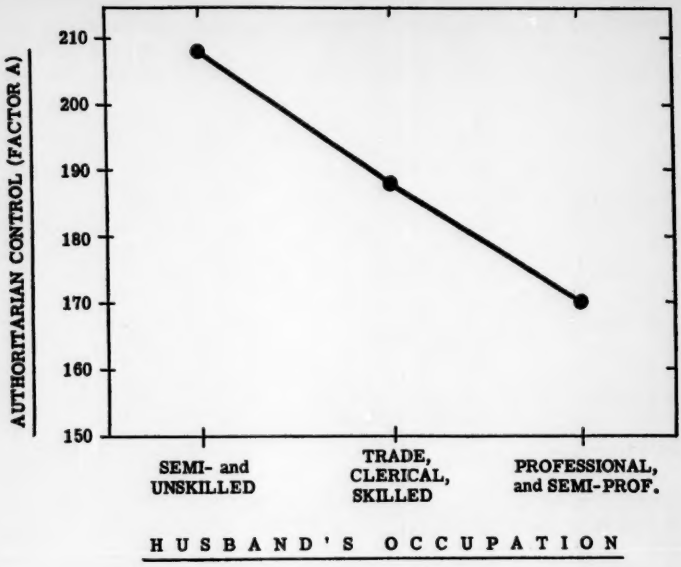

FIGURE 2—The relationship between the husband's occupational level and the mother's Authoritarian-Control factor score.

be seen in Table 1, the relation between age and factor A is not a linear one. Most of the between groups variance is caused by a sudden drop in the factor score in the 35 to 39 age group. The score rises again in the next higher age group. The *F* ratio for the Hostility-Rejection factor was not significant.

Age of the clinic child. The *F* ratio for mothers of children in the three age groups on the Authoritarian-Control factor was 4.09 which was significant below the .05 level. Examining the means for the three groups in Table 1, it can be seen that there is little difference between mothers of children in the 3 to 7 year group and those with children in the 8 to 12 year group, but there is a marked rise on this factor in the mothers of the teenage group. The *F* ratio for the Hostility-Rejection factor was not significant. Significant *F* ratios were found on the following individual scales for mothers: Strictness, Approval of Activity, Inconsiderateness of the Husband, Ascendance of the Mother, Acceleration of Development, and Dependency of the Mother. Significant differences were found on the following scales for fathers: Seclusiveness of the Father, Marital Conflict, Inconsid-

erateness of the Wife. In the case of all of these differences, for mothers and fathers, the parents of the teenage patients had the highest scores.

Family Constellation Comparisons

Number of children in the family. The *F* ratio for four groups (mothers with 1, 2, 3, and 4 or more children) on the Authoritarian-Control factor was 2.81, significant below the .05 level. The means for these groups (*see* Table 1) rise gradually with the increase in number of children with a sharper rise in the "4 or more" group. Significant *F* ratios were found on the following individual scales for mothers: Encouraging Verbalization, Excluding Outside Influences, Deification, and Suppression of Sex. The "4 or more" group had the highest score on all of these scales except Encouraging Verbalization, on which they had the lowest score. The following fathers' scales yielded significant *F* ratios: Irresponsibility of the Father, Deification, Suppression of Sex, and Change Orientation. On all of these scales mothers and fathers with four or more children had the highest scores.

Birth position of the clinic child. A comparison was made of families of two or more children in which the clinic child was (a) the oldest sibling, (b) intermediate in age, (c) the youngest sibling. The *F* ratios on both maternal attitude factors were not significant. Only two of the maternal attitude scales yielded significant *F* ratios: Rejection of the Homemaking Role and Acceleration of Development. None of the fathers' scales yielded significant *F* ratios.

Predominant sex of the children in the family. Two groups were compared: (a) families in which the children were predominantly or only female, (b) families in which the children were predominantly or only male. All other families were excluded from this comparison. Mothers of predominantly female children scored significantly higher on the Authoritarian-Control factor ($t = 2.38$, significant below the .05 level). No difference was found on the Hostility-Rejection factor. The mothers in families with predominantly female children scored significantly higher on the following individual scales: Fostering Dependency, Breaking the Will, Martyrdom, Deification, Inconsiderateness of the Husband, Suppression of Sex, Ascendance of the Mother, Intrusiveness, and Dependency of the Mother. No significant differences were found for fathers on any of the 25 scales.

Sex of the clinic child. The mothers of female clinic children tended to score higher on the Authoritarian-Control factor than the mothers of male clinic children but the difference fell short of significance ($t = 1.84$, $p < .10$).

The difference on the Hostility-Rejection factor was close to zero. The mothers of female clinic children scored significantly higher on two scales: Suppression of Sex and Ascendance of the Mother. The fathers of female clinic children scored significantly higher than the fathers of male clinic children on four scales: Fostering Dependency, Deception, Suppression of

Aggression, and Suppression of Sex. These four differences were all significant at better than the .01 level.

Presence or absence of the father in the home. The father was absent from the home due to separation or divorce in 30 out of 163 cases (18 per cent). The group of 30 separated or divorced mothers was compared with the remaining group of 133, and no significant differences were found on the maternal attitude factor scores.

Cooperativeness of the Parents with the Clinic

Time between initial contact with the clinic and receipt of the application form. The procedure at one of the clinics was as follows: As soon as a contact with the clinic was made by phone or letter, the date was noted and an application form was immediately sent out. The date of receipt of the application form was also noted in the chart. The time interval between these two dates could be taken as a crude estimate of the parents' motivation for treatment or their cooperativeness with clinic procedure. Mothers at this one clinic were divided into four interval groups (0–9, 10–19, 20–59, 60 or more days). Neither of the maternal attitude factors yielded a significant F ratio between these groups.

Cooperation in intake procedure. At one of the clinics the evaluation procedure extended over two or more sessions. In 19 out of 81 cases the parents discontinued contact with the clinic during this evaluation period without notifying the clinic or offering some compelling reason for the discontinuation. The mothers in these 19 cases were compared with the 62 cooperative mothers. Neither of the maternal attitude factors yielded a significant t value between these groups.

Acceptance vs. rejection of treatment. Thirty-five cases in both clinics were offered treatment. In 20 cases the offer was accepted; in 15 cases it was rejected. The differences between mothers in these groups were not significant on either of the maternal attitude factor scores. Significant ts were obtained on three of the individual scales for mothers: Martyrdom, Inconsiderateness of the Husband, and Dependency of the Mother. Significant differences were found on two scales between the two groups of fathers: Breaking the Will and Suppression of Affect. On all of these significant scales for mothers and fathers the parents of the group rejecting treatment scored higher.

The Effect of Partialling Out Mother's Education

Mother's education is related to a number of the other independent variables. Since it also relates strongly to factor A, it could account for the relation of these other variables with factor A. Therefore, each of the five other variables which yielded significant F ratios on factor A were cross-classified with mother's education, a multiple eta square was derived (using the sum of squares between cells), and the significance of the additional relation of the variable to factor A, after subtracting the variance due to mother's education, was obtained.

TABLE 2

SIGNIFICANCE OF VARIABLES CONTROLLING FOR MOTHER'S EDUCATION

Variable	*Proportion of variance on factor A due to Variable and Mother's Education* (Mult. η^2)	*Proportion of variance due to Mother's Education* (η^2)	N	*Added Proportion of variance due to Variable* (Mult. $\eta^2 - \eta^2$)	F	df	p*
Husband's Occupation ...	.45	.30	138	.15	3.24	10/123	.01
Mother's Age	.40	.25	159	.15	1.73	19/135	.05
Child's Age	.36	.28	162	.07	1.87	9/148	*ns*
Number of Children	.37	.29	165	.08	1.26	15/145	*ns*
Predominant Sex of Children	.30	.26	118	.04	1.08	5/108	*ns*

* Significance of the additional relationship of the variable to factor A after subtracting the proportion of the variance due to Mother's Education.

The results of these analyses can be seen in Table 2. Taking the first variable, husband's occupation, it can be seen that 45 per cent of the variance in the Authoritarian-Control factor is accounted for by the combination of this variable with mother's education. The proportion of variance (15 per cent) accounted for by husband's occupation, after subtracting the variance due to mother's education (30 per cent), was still significant ($p < .01$). Similarly, the proportion of variance (15 per cent) accounted for by mother's age alone was significant ($p < .05$). However, the relation between the Authoritarian-Control factor and child's age, number of children, and predominant sex of children seem to be a function of the relationship of these variables to mother's education.

DISCUSSION

Parental attitude measures have not shown any marked relation with the diagnostic or symptomatic characteristics of the child or the response of the parents to the clinics. No significant differences were found on the maternal attitude factors, and the number of differences on individual scales was not impressive considering the number of comparisons made. Even on the scales where significant differences were found between parents of clinic patients and parents of normal children, the parents of clinic patients scored lower rather than higher, as theory would suggest. It is quite likely that the "clinic" parents were threatened by the inventory and expressed their defensiveness by giving the answers that they felt would

be most socially desirable. In a group of female psychiatric patients (15) the MMPI K score, a measure of psychological defensiveness, correlated significantly with both the Authoritarian-Control factor and the Hostility-Rejection factor. However, even if defensiveness is related to the elevation on the parental attitude scales, it is difficult to understand why Bell's technique of converting raw scale scores to relative scores based on each *S*'s general scale elevation did not provide more discrimination between the clinic and normal groups of mothers.

Conceding the possibility that the failure to find many differences between the clinic and normal parents may be attributed to the greater defensiveness of the clinic group, it must be remembered that the scales also failed to yield significant differences between diagnostic and symptomatic subdivisions of the clinic group itself. Moreover, the scales did not predict such gross behavioral decisions as continuing or discontinuing the clinic contact and accepting or refusing proffered treatment for the child. At this stage, clinical applications of these scales should be interpreted with extreme caution.

The most powerful determinant of response to the Authoritarian-Control dimension of maternal attitudes proved to be the socioeconomic level of the mother as judged from her educational attainment and her husband's occupation. The relation with education has been found in samples used in previous studies (15, 16, 17). Together, these variables account for 45 per cent of the variance of the Authoritarian-Control factor in this sample of clinic mothers. The current childrearing ideal communicated to mothers by psychologists and educators stresses democratic and permissive techniques rather than authoritarian, controlling techniques. This communication is much more likely to affect middle-class, highly educated mothers than working class mothers because they are more frequently exposed to it in the schools and the communication media—women's magazines, in particular. Does the relation between socioeconomic status and the Authoritarian-Control attitudes reflect differences in actual childrearing patterns between classes in our society? The Sears, Maccoby, and Levin study (11) would suggest that this is so. In comparing middle-class and working-class mothers, they found that the middle-class mothers were more permissive in four of the five major areas of socialization investigated. The factor of mother's education yielded similar findings.

The Miller and Swanson (8) results, based on a study in the Detroit area, contradict both the results of Sears *et al.* and the results of this study. Miller and Swanson did not find many differences in childrearing patterns attributable to class or mother's education when other variables were controlled. In fact, they even noted a trend toward less permissive child training at the upper educational levels. Both of these studies were based on structured interviews in which mothers were asked about their childrearing behavior. The possibility remains that their actual behavior might differ from their descriptions of it in interviews. There is a need for observational

studies of maternal behavior in the different social classes to answer this question.

The finding of a significant drop in scores on the Authoritarian-Control factor in the 35 to 39 year old age group of mothers relative to younger and older groups is a puzzling one. In the normative sample (17) several maternal scales showed positive linear correlations with age. Sears *et al.* (11) found that younger mothers tended to be more irritable and punitive than older mothers. However, they used only two groups and presumably divided the total group at the median (33.6 years of age). This would place the 35 to 39 group entirely within their older mother group. From their reported variation it would seem that about half of the mothers in their older group would fall into the 35–39 year range. If it is these mothers who were the more permissive ones in the older group, the Sears data would then be consistent with the findings of the present study. Perhaps the mothers in their late 30's were indoctrinated during the peak of the permissive era of childrearing (early 1940's). Currently there seems to be a swing away from the de-emphasis on parental control and discipline with the "experts" warning mothers about too little control as well as too much control. This impression is supported by the Miller and Swanson (8) review of childrearing advice given by "experts" from the eighteenth century to the present. They find that the strict, controlling, suppressive parental behavior advocated in the 1930's changed to a bland, nondirective sort of permissiveness in the period 1942 to 1945. These authors note that advice from 1945 to the present, while still more permissive than that given in the 1930's, tends to stress again the need for "limits," "control," and the development of behavior which is socially adaptive. It is not assumed now that such socially adaptive behavior develops spontaneously.

Although the relations between the clinic child's age, number of children in the family, and sex of children in the family and the scales of the PARI may be entirely a function of the influence of the mother's education, they seem to make some theoretical sense and might be worth re-examining in a nonclinical group which is homogeneous in educational level. The parents of the teenage clinic patients seem to manifest more marital dissatisfaction and demand more striving on the part of the child. The parents in larger families seem to expect more submissiveness of children to parental control, respect for parents, and suppression of sexual impulses. Mothers of predominantly female children seem to be more controlling, overprotective, ascendant, punitive and demanding of sexual suppression. The fathers' attitudes, on the other hand, are not related to the sex of the children.

Summary

The purposes of this study were: (a) to determine if parental attitudes differ quantitatively in parents of child guidance cases and normals or if they distinguish between parents of various types of cases in the clinic

group; (b) to determine the influence of socioeconomic, age, and family constellation factors on attitudes within the clinic group; (c) to determine if parental attitudes have any predictive value in relation to the cooperativeness of parents with the clinic. The subjects were 165 mothers and 140 fathers of patients from two child guidance clinics and 181 mothers and 36 fathers from a normative sample. Attitudes were measured with the Parental Attitude Research Instrument using the forms for mothers and fathers. Two summative factor scores on the maternal attitude inventory and scores on the individual scales of the maternal and paternal inventories were used. Other variables were assessed by psychologists from the case history reports.

Parental attitude measurements were not markedly related to the child's diagnosis or symptom type within the clinic group and did not yield marked differences between the clinic parents and controls. Parental attitude scores neither predicted the parents' cooperativeness with the clinics nor distinguished a group of "defectors." The major determinant of maternal attitudes within the clinic group was the socioeconomic level of the mother as defined by her educational level and her husband's occupation. The less educated lower class mothers had the more authoritarian, controlling attitudes. The mother's age was significantly related to her attitudes, although in a nonlinear fashion. The age of the clinic child, the number of children in the family, and the sex of the children in the family were significantly related to parental attitudes, but such relations appeared to be a function of the relation of these variables to the mother's education.

References

1. Bell, R. Q. Maternal types identifiable through attitude measures. *Amer. Psychologist,* 1957, 12, 398-399. (Abstract)
2. Crandall, V. J., & Preston, Anne. Patterns and levels of maternal behavior. *Child Develpm.,* 1955, 26, 267-277.
3. Gordon, J. E. The validity of Shoben's Parent Attitude Survey. *J. clin. Psychol.,* 1957, 13, 154-156.
4. Levitt, E. E. A comparison of "remainers" and "defectors" among child clinic patients. *J. consult. Psychol.,* 1957, 21, 316.
5. Levitt, E. E. Parents' reasons for "defection" from treatment at a child guidance clinic. *Ment. Hyg.,* 1958, 42, 521-524.
6. Leyton, D. A. A study of the validity of parent attitude measurement. *Child Develpm.,* 1958, 29, 515-520.
7. Mark, J. C. The attitudes of the mothers of male schizophrenics toward child behavior. *J. abnorm. soc. Psychol.,* 1953, 48, 185-189.
8. Miller, D. R., & Swanson, G. E. *The changing American parent.* New York: Wiley, 1958.

9. SCHAEFER, E. S., & BELL, R. Q. Structure of attitudes toward child-rearing and the family. *J. abnorm. soc. Psychol.*, 1957, 54, 391-395.

10. SCHAEFER, E. S., & BELL, R. Q. Development of a parental attitude research instrument. *Child Develpm.*, 1958, 29, 339-361.

11. SEARS, R. R., MACCOBY, ELEANOR, & LEVIN, H. *Patterns of child rearing*. Evanston, Ill.: Row-Peterson, 1957.

12. SHOBEN, E. J. The assessment of parental attitude in relation to child adjustment. *Genet. Psychol. Monogr.*, 1949, 39, 101-148.

13. ZUCKERMAN, M. Reversed scales to control acquiescence response set in the Parental Attitude Research Instrument. *Child Develpm.*, 1959, 30, 523-532.

14. ZUCKERMAN, M., NORTON, J., & SPRAGUE, D. S. Acquiescence and extremes sets and their role in tests of authoritarianism and parental attitudes. *Psychiatric Res. Repts.*, 1958, 10, 28-45.

15. ZUCKERMAN, M., & OLTEAN, MARY. Some relationships between maternal attitude factors and authoritarianism, personality needs, psychopathology, and self-acceptance. *Child Develpm.*, 1959, 30, 27-36.

16. ZUCKERMAN, M., OLTEAN, MARY, & MONASHKIN, I. The parental attitudes of mothers of schizophrenics. *J. consult. Psychol.*, 1958, 22, 307-310.

17. ZUCKERMAN, M., RIBBACK, BEATRICE B., MONASHKIN, I., & NORTON, J. A. Normative data and factor analysis on the Parental Attitude Research Instrument. *J. consult. Psychol.*, 1958, 22, 165-171.

AGE DIFFERENCES IN THE EFFECTIVENESS OF DIFFERENT REINFORCEMENT COMBINATIONS ON THE ACQUISITION AND EXTINCTION OF A SIMPLE CONCEPT LEARNING PROBLEM[1]

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Most investigations concerned with the effectiveness of reinforcements on the learning behavior of children have generally neglected to include developmental variables. This seems particularly unfortunate in the light of known facts concerning the importance of developmental factors in the behavior of children. It would seem, too, that the comments of teachers and others working with children that certain reinforcers are more effective with older children merits systematic investigation. The methodological problem of providing a learning task which will be both meaningful and of equal difficulty for two age levels has probably been an important reason for so few studies. Recently, however, Terrell (7) and Terrell and Kennedy (8) have reported a concept learning task (acquiring the concept "larger than") which is acquired by *Ss* ages 4 to 5 and 8 to 9 at approximately the same rate and with equal variability. The present writers have employed this task to investigate the effectiveness of four reinforcement combinations at two developmental levels.

The studies reported by Terrell *et al.* are particularly relevant to this investigation in that the value of their reinforcers were found to be similar for preschool *Ss* (ages 4 to 5) and older *Ss* (ages 8 to 9). An examination

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Child Develpm., 1960, 31, 419-429.

of the experimental procedures employed may serve to explain the results of these studies. All of their groups received a light flash upon making a correct response and, in addition, except for the control *Ss*, each group received additional reinforcers of either candy, tokens to be accumulated for candy, verbal praise, or verbal reproof. The instructions were so worded that a light flash clearly meant that a correct answer had been given and no-light flash meant an incorrect response had been made. The *Ss* in the various experimental groups apparently knew nothing in advance of the other rewards. One might speculate that, since both age groups understood exactly how and when they were to be reinforced, there was little opportunity for variation in interpretation of the learning situation, particularly the meaning of *E*'s behavior. If the instructions specifying the meaning of the light had been omitted, little learning would probably have occurred unless the *Ss* interpreted, from past experience, the light as a positive reinforcer. If candy had been used as the basic reinforcer rather than the light, more learning would have occurred because candy has a stronger association with "good" behavior than a light flash. Since older children have had more experience with adults in learning situations than preschoolers, it seems reasonable to expect that they would be more sensitive to the reinforcement cues and should therefore perform better than the younger *Ss*.

The experimental procedures described later in this paper are intended to provide an ambiguous learning situation. The three pairs of verbal reinforcers used in this study (Right-Wrong, Nothing-Wrong, Right-Nothing) are identical to those used by Buss (3, 4) and Buchwald (2). A fourth pair of reinforcers, Buzzer-Nothing, was also used in the present investigation to determine if a mechanical reinforcer influenced behavior in a manner similar to the verbal reinforcers. It is assumed that the ***nothing*** aspect of these pairs represents an ambiguous condition which can be interpreted as either positive or negative reinforcement depending upon previous experience. It is further assumed that the presentation of the buzzer without specifying its meaning is also ambiguous.

Both the Buss studies and the Buchwald study are in agreement that the Right-Nothing pair of reinforcers is least effective in learning. With respect to the other two pairs of reinforcers Buss found no differences between them whereas Buchwald reports that his Right-Wrong group learned significantly faster than the Nothing-Wrong group. Since different learning tasks were used by these investigators, it is difficult to determine the reasons for this discrepancy in results. Of considerable interest, however, are the contrasting interpretations given their results. Buss contends that "wrong" is a stronger negative reinforcer than "right" is a positive reinforcer, assuming ***nothing*** to have zero reinforcement value. Buchwald argues that ***nothing*** does not have zero reinforcement value but rather that it acquires value depending upon how it is paired. If paired with "wrong," it takes on positive value; if paired with "right," it acquires negative value. Either explanation more or less adequately explains the acquisition data, but not the extinction

generalization data. Buchwald's data show that the Nothing-Wrong group does not extinguish whereas the Right-Nothing group does. This finding can be more reasonably interpreted if the assumption that *nothing* acquires reinforcement value is made. The experimental procedures employed in the present investigation are also relevant to the foregoing theoretical issues.

Method

A total of 160 children, 80 four- and five-year-olds and 80 eight- and nine-year-olds, were used as *Ss*.[2] Approximately the same number of boys and girls were included in each age group. The *Ss* were from better than average socioeconomic environments and represented an intellectually superior group.

The stimuli for the problem were nine pairs of three dimensional geometric blocks in the shape of cylinders, triangles, and rectangles (hereafter referred to as the acquisition series). The color (red) and heights (2 in.) of all blocks were constant; the basal surface area was either 2 in. or 1 in. For the extinction trials the same basal area relationships (2:1) existed, but the heights of the stimuli were reduced by 1 in., 1.5 in., and 1.75 in. The stimulus pairs were presented simultaneously with the larger basal area always being the correct block. The blocks were randomly paired with the single restriction that each pair contain a large and a small basal area. Presentation of the stimuli and the position of the correct block were also randomized. Additional apparatus consisted of a portable box attached to which was a board to serve as a blind. A buzzer was also secured to this board and was out of sight of the *Ss*.

There were eight experimental groups comprised of four treatments and two age levels. The *Ss* in the Right-Wrong (RW) group were told "right" following a correct response and "wrong" following an incorrect response. The *Ss* in the Right-Nothing (RN) group were told "right" following a correct response and *nothing* following an incorrect response. The *Ss* in the Nothing-Wrong (NW) group were told *nothing* following a correct response and "wrong" following an incorrect response. The Buzzer-Nothing (BN) group heard the sound of a buzzer after a correct response and *nothing* for an incorrect response. Treatments were identical for each age level, and the *Ss* were randomly assigned to each of the experimental groups affording 20 *Ss* in each treatment-level combination.

The *Ss* were tested individually. Each *S* received the same instructions: "I am going to show you two blocks at a time. Each time you must choose, by pointing with your finger, the block that you think is the correct one. Remember that one block is always the right block to choose and one block is always the wrong block to choose." After reaching a criterion of nine

[2] The writers wish to express their appreciation to Dr. Allen Figurel, principal of Falk Elementary School, and to Dr. Douglas Lehman, assistant principal of the Sheffield School, for their cooperation in making *Ss* available for this study.

out of ten correct responses, or a maximum of 30 responses, whichever came first, each *S* was immediately started on the extinction series of five trials for each of three stimulus conditions. During this series, *E* remained quiet.

TABLE 1

MEANS AND STANDARD DEVIATIONS OF NUMBER OF CORRECT RESPONSES ON THE ACQUISITION TRIALS

	Age 4 to 5		Age 8 to 9	
Treatment	*M*	*SD*	*M*	*SD*
RW	15.05	3.45	14.30	4.31
RN	13.00	4.78	13.90	3.70
NW	14.50	3.56	16.15	2.51
BN	14.80	3.23	13.90	3.83

RESULTS

The mean number of correct responses for each of the six blocks of five trials are presented in Figure 1. Initial inspection of these data indicated that after the fourth block of trials all groups were responding at approximately the same level. An analysis of variance of correct responses made on trials 21 to 25 as compared with trials 26 to 30, for both age groups, supports this observation ($F = 1.13$, $df = 1, 152$). In the light of this analysis and in view of the concern with the differential effects of the paired reinforcers on learning, only the first 20 trials are included in the statistical treatment of the acquisition data. Table 1 shows the means and sigmas of the total number of correct responses made on these first 20 trials.

TABLE 2

ANALYSIS OF VARIANCE OF CORRECT RESPONSES ON ACQUISITION TRIALS

Source	*df*	*Mean Square*	*F*
Ages (A)	1	.51	
Groups (G)	3	6.09	2.05
A × G	3	9.32	3.90**
Between *Ss* in Same Group	152	2.39	
Trials (T)	3	43.51	43.95**
T × A	3	.07	
T × G	9	1.32	1.33
T × A × G	9	8.82	8.91**
T × *Ss* in Same Group	456	.99	

* $p < .05$.
** $p < .01$.

An analysis of variance for repeated measures on the same Ss as described by Edwards (5) was performed on both the acquisition and extinction data. The Bartlett test for homogeneity of variance resulted in nonsignificant chi squares and inspection of both distributions revealed no marked nonnormality.

A summary of this analysis is presented in Table 2. The following conclusions are warranted: (a) the effects of age and treatments are not statis-

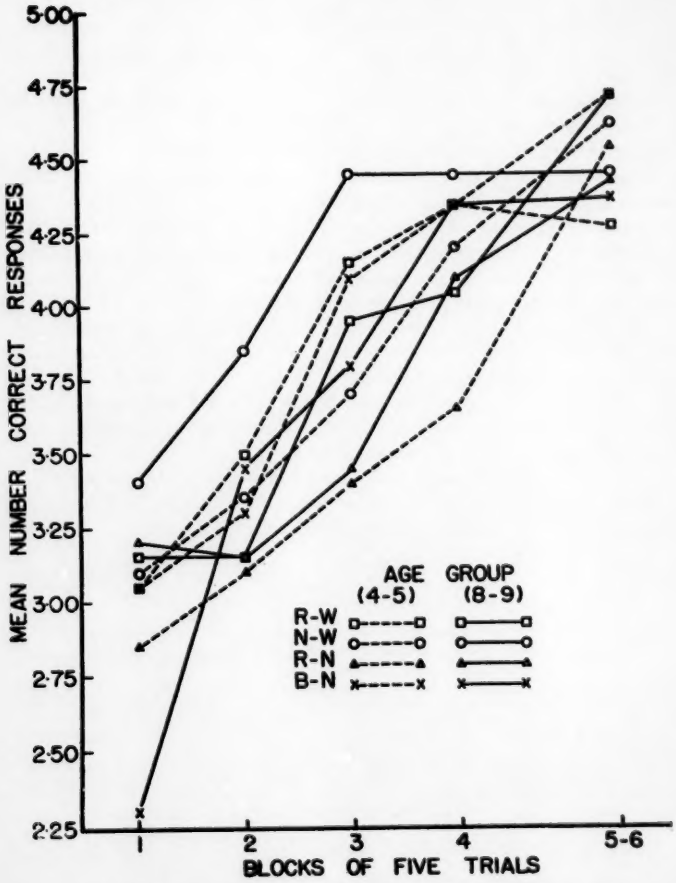

FIGURE 1—Mean number of correct responses on the acquisition trials.

tically significant; (b) the age × treatments interaction is statistically significant, i.e., the effectiveness of the reinforcers is related to developmental level; (c) the between trials effect is statistically significant, i.e., the learning curves are not flat; (d) the trials × age and trials × treatments interactions are statistically nonsignificant, i.e., any differences in the slopes of the learning curves are not related to either age or treatments; (e) the triple interaction, trials × age × treatments, is statistically significant, i.e., differences in the slopes of the learning curves are related to both age level and treatment conditions.

The significant age × treatments and trials × age × treatments interactions support the position taken earlier in this paper that ambiguous learning conditions would result in differential reinforcer effectiveness. Examination of Table 1 reveals the following rank order of treatment effectiveness for the preschoolers: RW, BN, NW, RN; and for the older *Ss*: NW, RW, BN and RN tied. Since the differences between treatments within an age group and the differences between age levels were not statistically significant, individual *t* tests are inappropriate in evaluating the interaction. In an effort to cast some light on the major sources of variance contributing to the interaction term, all possible combinations of 2 × 2 tables were arranged with age as one variable and treatments as the second variable. For each table the differences between treatments for each age group and the differences between age levels for each treatment were examined. These differences indicate that the interaction is apparently the result of the superior performance of the older *Ss* in the NW treatment and the superior performance of the preschool *Ss* in the RW and BN conditions. The two experiments necessary to clearly identify the exact way in which these treatments interact are presently under way.

The mean performance of each experimental group on the three sets of stimuli constituting the extinction series may be examined in Table 3 and Figure 2. The most striking feature of these data is the continual improve-

TABLE 3

MEANS AND STANDARD DEVIATIONS OF NUMBER OF CORRECT RESPONSES ON EACH SET OF STIMULI ON THE EXTINCTION TRIALS

	STIMULUS HEIGHT (INCHES LESS THAN STANDARD)															
	0 Inches				1 Inches				1.5 Inches				1.75 Inches			
Treatment	AGE 4–5		AGE 8–9		AGE 4–5		AGE 8–9		AGE 4–5		AGE 8–9		AGE 4–5		AGE 8–9	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
RW	4.27	2.13	4.73	1.46	3.75	.76	3.80	1.21	3.45	1.49	3.10	1.55	3.15	1.72	3.55	1.66
RN	4.55	1.96	4.42	1.87	3.65	1.00	3.05	1.31	3.45	1.12	2.90	1.14	3.75	1.43	3.05	1.34
NW	4.62	1.41	4.45	2.10	4.55	1.33	3.90	1.41	4.40	1.33	4.10	1.19	4.30	1.27	4.35	.72
BN	4.73	1.27	4.37	2.10	3.80	1.38	2.85	1.28	3.05	1.21	3.00	1.45	3.55	1.31	2.95	.96

ment in performance of the NW group after the first block of five extinction trials. An analysis of variance presented in Table 4 supports the observation that there exists a significant treatment effect. Age level and the age × treatments effect are statistically nonsignificant. In addition, the same analysis indicates that the effect of stimuli and the stimuli by treatments interaction are statistically significant. These results can be interpreted as meaning that the slopes of the generalization curves are not parallel.

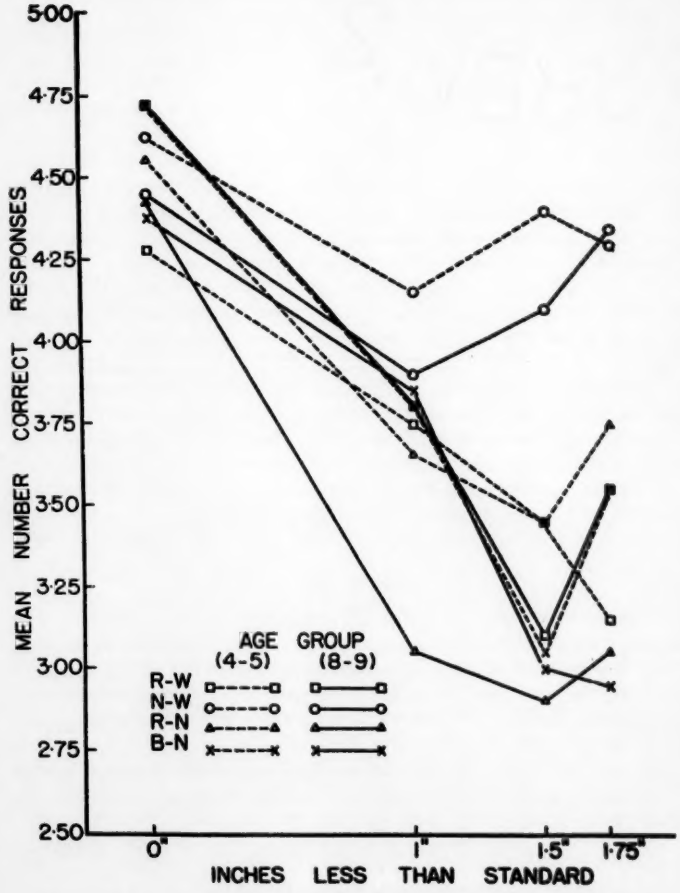

FIGURE 2—Mean number of correct responses on the extinction trials.

TABLE 4

ANALYSIS OF VARIANCE OF CORRECT RESPONSES ON EXTINCTION TRIALS

Source	*df*	*Mean Square*	*F*
Age (A)	1	7.87	2.51
Groups (G)	3	48.34	16.11**
A × G	3	3.70	1.18
error A	152	3.13	
Stimuli (S)	3	33.57	37.72**
S × G	9	2.73	3.34**
S × A	3	.78	
S × A × G	9	.73	
error B	456	.89	

** $p < .01$.

The significant treatments effect was evaluated by comparing the mean number of total correct responses made over all sets of stimuli by means of t tests. The NW-BN and NW-RN comparisons are statistically significant ($t = 2.90$, $df = 39$; $t = 2.34$, $df = 39$) at the 5 per cent level whereas the RW-NW comparison failed to reach acceptable significance level ($t = 1.70$, $df = 39$, $p = .08$). No other comparisons approached statistical significance. It can be concluded that performance on the generalization series is affected by the experimental treatments and that the NW group, regardless of age, performs reliably better than the other groups. Additional evidence for this conclusion may be derived from the significant stimuli × groups interaction. Examination of Figure 2 in terms of this interaction shows that the NW group actually improves in performance after the first new set of five stimuli whereas the other groups decline.

DISCUSSION

Several issues growing out of the acquisition series are apparent. The significant interactions reported in these data can be interpreted as meaning that developmental level is an important variable in the determination of reinforcer effectiveness when the conditions defining reinforcement are ambiguous. There is one factor, however, which limits the foregoing generalization. It will be recalled that the data do not permit us to state precisely how treatments interact with developmental level, i.e., what specific reinforcers are differentially effective. Examination of the treatments for each age level suggest, however, that the BN, RW, and NW pairs of reinforcers are contributing the larger proportion of variance to the interaction effect. Two studies are under way in which the two age levels are exposed to the BN-NW and RW-NW treatments. This design affords two experiments which will hopefully designate more precisely the interaction effect.

A second issue relevant to the acquisition data relates to the general problem of the relative effectiveness of rewards and punishments in children's learning. Brackbill and O'Hara (1), using kindergarten children and candy-nothing and candy-removal of candy as treatments, report that the latter group learned significantly faster. These investigators interpret their data as supporting the view that punishment serves as an additional source of drive producing a higher rate of learning than when only reward is given. Similar results are reported by Buchwald (2) for college sophomores. Our data generally support these findings, particularly amongst our older *Ss*. Though the differences between treatments are not statistically significant, the rank order of effectiveness places the two reward-nothing groups at the bottom with the NW and RW groups ranking one and two respectively. It would seem that, for these older children, punishment does serve to increase drive. However, it should be noted that the same data are also consistent with the notion that wrong is a stronger negative reinforcer than right is a positive reinforcer. In the case of our preschool *Ss*, the BN treatment ranked second to the RW with NW and RN following in that order. Here again the RN reinforcement is the least effective verbal reinforcer and lends further support to the foregoing conclusions. The rank position of the BN group may be a fortuitous occurrence and will be evaluated in a subsequent paper.

The significant stimuli $\times$ groups interaction and the significant treatments effect for the extinction series warrant additional comment. Recall that the NW group performed reliably better than the other groups and that their performance improved over the three sets of stimuli whereas the other groups tended to decline. The *actual improvement in* performance by the NW *Ss* is more consistent with the position that *nothing* acquires reinforcement value when paired with *wrong*. Each response made by the NW group during extinction *is reinforced* and, after initial adaptation to the new stimuli, is reflected in improved performance. The contention that *nothing* has neutral reinforcement value would necessarily lead to the prediction that the NW group would extinguish, although at a slower rate than the positively reinforced groups. Either interpretation supports the extinction curves when positive reinforcement is involved during acquisition. However, it is our feeling that in this case *nothing* acquires negative reinforcement value and, as such, serves to interfere with previously learned responses.

Contrasting the results of this and the other similar studies already mentioned with the now classic investigation of Hurlock (6) presents some interesting speculative issues. She found that her praise group performed best followed by the blamed and ignored groups. Aside from many important methodological differences between these studies, it should be remembered that her *Ss* were already aware of the important discriminations necessary to perform the task and that it was a question of improving *performance*. This situation is quite different from having to learn the

relevant discriminanda before making appropriate responses. Perhaps, as the data indicate, negative reinforcement is a necessary condition during the initial stages of learning, but that after learning has occurred positive reinforcement produces the best performance. Stated differently, we are suggesting that perhaps statements of right and wrong serve as cues to appropriate discriminations as well as reinforcers, but after the discriminations have been established serve as reinforcers only. In this framework two hypotheses seem tenable: (a) given a sufficient number of trials, reinforcement pairs including a positive reinforcer (RW, RN) should eventuate in a higher level of performance than when no positive reinforcement is present (NW); and (b) assessment of reinforcer effectiveness may be related to the number of trials allowed. The data in Table 4 suggest that these questions will be answered in the affirmative by further research.

Summary

The effectiveness of four combinations of reinforcers at two developmental levels was analyzed in this experiment. The combinations were Right-Wrong, Right-Nothing, Nothing-Wrong, and Buzzer-Nothing. It was assumed that the *nothing* aspects of these reinforcers would be sufficiently ambiguous to permit age differences in sensitivity to reinforcing cues to function. The *Ss*, age 4 to 5 and 8 to 9, were required to learn the concept "larger than" by responding to pairs of blocks. A significant age × treatments effect for the acquisition series was interpreted as meaning that the effectiveness of these reinforcers is related to level of development. The Nothing-Wrong group performed significantly better on the extinction series than the other groups. This latter finding was interpreted as meaning that *nothing* when paired with wrong acquires positive reinforcement value.

References

1. Brackbill, Yvonne, & O'Hara, J. The relative effectiveness of reward and punishment for discrimination learning in children. *J. comp. physiol. Psychol.*, 1958, 6, 747-751.
2. Buchwald, A. M. Extinction after acquisition under different verbal reinforcement combinations. *J. exp. Psychol.*, 1959, 57, 43-48.
3. Buss, A. H., Braden, W., Orgel, A., & Buss, Edith. Acquisition and extinction with different verbal reinforcement combinations. *J. exp. Psychol.*, 1956, 52, 288-295.
4. Buss, A. H. & Buss, Edith. The effect of verbal reinforcement combinations on conceptual learning. *J. exp. Psychol.*, 1956, 52, 283-287.
5. Edwards, A. L. *Experimental design in psychological research.* New York: Rinehart, 1950.

6. HURLOCK, ELIZABETH B. The value of praise and reproof as incentives for children. *Arch. Psychol.*, N.Y., 1924, No. 271.

7. TERRELL, G. The role of incentive in discrimination learning in children. *Child Develpm.*, 1958, 29, 231-236.

8. TERRELL, G., & KENNEDY, W. A. Discrimination learning and transposition in children as a function of the nature of the reward. *J. exp. Psychol.*, 1957, 53, 257-260.

THE LATENCY-STAGE STORY PREFERENCES OF AMERICAN AND FINNISH CHILDREN

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The writers have previously described their interest in the responses children make to their favorite story and plans for a series of studies to focus on two central questions: "What stories do children like?" and "Why do they seem to like them?" Data about favorite stories for the whole of childhood, as judged retrospectively by American college students, have been reported (4, 5, 6).

The present paper, the fourth in this series, concerns the story preferences of grade-school children in two countries: an American group composed of children enrolled in the fourth and fifth grades of a New Jersey school and a Finnish group of elementary school children in Helsinki. Initially, it was expected that the story preferences of the subjects, presumably in the latency stage, would reflect differences in their respective cultural contexts.

SUBJECTS AND PROCEDURE

The American group, composed of 98 girls and 101 boys, was enrolled in the fourth and fifth grades of a public school in Islen, New Jersey.[2] The

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[2] The writers wish to thank the following teachers at Public School No. 6, Islen, New Jersey for making their classes available for testing: Mrs. Sherman M. Ancier, Mrs. Walter Cohen, Miss Carol R. Tillman, Mrs. Harvey Weinberg (4th grade); Miss Cecilia Artym, Miss Eileen Burke, Miss Rose Carchio, and Mr. Charles Peins (5th grade).

average age of the American girls was 8.9, of the boys, 10.1, and of the total group, 10.0 years. The Finnish group of 120 children, 60 of each sex, was enrolled in a public school in Helsinki[3] in grades roughly comparable to those of the American sample. The mean age of both the girls and boys was 11.1 years.

Each child was asked by his teacher to complete a questionnaire concerning his favorite story, certain features of the story, and the circumstances of first encountering it. In addition, he was asked to summarize the story in his own words. The results reported here are based on replies from the total sample of 319 children: 98 American girls, 101 American boys, 60 Finnish girls, and 60 Finnish boys.

Results and Discussion

The Story Titles

The story titles reported by the subjects varied greatly so that any one favorite title was seldom repeated. Consequently, no clear trend toward a general preference by all groups for one specific story was observed.

Table 1

CLASSIFICATION OF THE FAVORITE STORIES OF AMERICAN AND FINNISH CHILDREN

Story Classification	American				Finnish				Total				Total				*Grand Total*	
	Girls		*Boys*		*Girls*		*Boys*		*Amer.*		*Finn.*		*Girls*		*Boys*			
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Fiction	44	44.9	46	45.5	28	46.7	47	78.3	90	45.2	75	62.5	72	45.6	93	57.8	165	51.8
Fairy Tales	28	28.6	10	9.9	16	26.7	1	1.7	38	19.1	17	14.2	44	27.8	11	6.8	55	17.2
Informational	5	5.1	18	17.8	8	13.3	8	13.3	23	11.6	16	13.3	13	8.3	26	16.1	39	12.2
Biography	6	6.1	15	14.9	3	5.0	1	1.7	21	10.5	4	3.3	9	5.7	16	9.9	25	7.8
Animal	13	13.3	7	6.9	5	8.3	1	1.7	20	10.1	6	5.0	18	11.4	8	5.0	26	8.2
Religious	1	1.0	0	0	—	0	1	1.7	1	.5	1	.8	1	.6	1	.6	2	.6
Unclassified	1	1.0	3	3.0	—	0	1	1.7	4	2.0	1	.8	1	.6	4	2.5	5	1.6
No Response	0	0	2	2.0	—	—	—	—	2	1.0	—	—	0	0	2	1.3	2	.6
Total	98		101		60		60		199		120		158		161		319	

The Preferred Story Category: Fiction

Grouped on the basis of Arbuthnot's (1) classification system, the stories fell into the categories of fiction, fairy tales, information, biography, animal, and religious stories; a few could not be classified (Table 1). A clear

[3] The writers also express their appreciation to Miss Sirkka Kamu of the Helsinki Public School System for her cooperation in administering and translating the Finnish forms of the story questionnaire.

preference by both American and Finnish children was found for the fiction stories. This preference for fiction was particularly marked in the Finnish boys, of whom 78.3 per cent said they preferred fiction stories compared to the relatively less emphatic preference for fiction reported by the Finnish girls (46.7 per cent), American boys (45.5 per cent), and American girls (44.9 per cent).

TABLE 2

FAVORITE FICTION STORIES OF AMERICAN GIRLS
(N = 44, 45 per cent)

Title	*Frequency*	*Title*	*Frequency*
The Bobbsey Twins	8	Who Will Play with Me	1
Heidi	5	Ah-Yo-Ka Daughter of Sequoyah	1
No Children, No Pets	4	Dana Girls Mystery	1
Nancy Drew Mystery	3	Mrs. Pickrell Goes to Mars	1
The Song of the Dove	1	The Clue of the Store Lantern	1
Friends to Make	1	Elevator to the Moon	1
My Big Brother	1	Larkspur Lane	1
Home Is Fun	1	The Invisible Chimes	1
Plain Jane and Pretty Betty	1	The Vanishing Shadow	1
Little Women	1	Cherry Ames	1
Ginny Gordon and the Mystery at the Old Barn	1	Here Tricks, Here	1
		The Message in the Hollow Oak	1
George Washington Lincoln Goes Around the World	1	Mary's Rainbow	1
		The Clue of the Broken Locket	1
Betty's Little Star	1	The Mystery at Lilac Inn	1

The Girls

Several fiction stories were chosen more than once (Table 2) by the American girls: *The Bobbsey Twins* (8), *Heidi* (5), *No Children, No Pets* (4), and *Nancy Drew Mystery* (3). The Finnish girls did not select (Table 3) any fiction title identical with those chosen by the American girls. They named the following stories more than once: the *Anna* books (4), the *Katy* books (3), *The Secret of Lise and Lotte* (2), *The Heir of Tottisalmi* (2), *The Quintet Escapes* (2), and *Sara and Sari* (2).

Judging from the character of all the fiction stories chosen by the American and Finnish girls, they similarly seemed to favor stories in which the adult characters were merely in the background, absent, or dead and in which the plot revolved around main characters who were girls, boys, or both, and of the subjects' age or slightly older. For example, in the American choice, *Heidi,* the heroine was an orphan as was also true of *Anna* and *Sara and Sari,* chosen by the Finnish girls.

The major characters in the fiction stories chosen by the girls tended to be multiple, as siblings or close friends, or of an interchangeable appearance, as in *The Bobbsey Twins* (American), *The Quintet,* and *Lise and Lotte* (Finnish). Far more than one would expect in randomly selected

TABLE 3

FAVORITE FICTION STORIES OF FINNISH GIRLS
($N = 28$, 46.7 per cent)

Title	*Frequency*	*Title*	*Frequency*
Anna Books	4	Our Friend Karoliina	1
Katy Books	3	Tomboy	1
The Secret of Lise and Lotte	2	Sisters Grow Up	1
The Heir of Tottisalmi	2	Doris	1
The Quintet Escapes	2	We Three Protegees of Ritva	1
Sara and Sarri	2	Family at Kulmakuja	1
Adventurous Island	1	The Secret Affair	1
Tiina Goes to High School	1	Boys Are Detectives	1
Kalela Comes Over the Sea	1	Treasure on the Murphisaari	1
Miss Detective Series	1		

fiction stories, they were engaged in traveling not only to routine vacation spots but to the moon or the stars and in unraveling mysteries (Tables 2, 3).

The fiction story choices of both groups of girls, therefore, regardless of cultural backgrounds, showed a rather homogeneous feminine taste in *type* of story. Speculations concerning the similar tastes of these girls follow:

1. In these stories, the de-emphasis of adult characters and indication that parent figures are either absent or dead, together with the accent on character similar in age to the subjects, probably reflected a latency-stage tendency to focus more obviously on peer relationships than upon those with the parents. Indeed, the orphanhood theme, as in *Heidi* and *Anna,* might have been attractive as a vicarious expression of death wishes against the disappointing, oedipal parents. Since many of the subjects probably passed through the oedipal stage soon after the end of World War II, for some of them parental absence, disability, death, or the threat of these might have accentuated the usual, oedipal-stage difficulties. However, if this kind of experience contributed to an interest in the orphanhood theme, its effect was not perceptibly greater upon the Finnish than upon the American girls as one would have expected because of the generally more direct exposure of the Finns to wartime conditions.

2. The fact that the leading story characters were not only female, but male, as in *George Washington Lincoln Goes Around the World* (American) and *Boys Are Detectives* (Finnish), or boyish girls, as in *Nancy Drew* (American) and *Tomboy* (Finnish), might have served simply to strike a rather "neuter" note, appropriate to latency. But it might also betray some resistance by the girls to identifying with exclusively female figures because of envy for the male's more prestigeful or more active role.

3. That the leading characters were often of almost interchangeable appearance, as twins or quintets, or engaged in solving family inheritance puzzles, as in *The Heir of Tottisalmi,* perhaps relates to latency-stage desires of the family-romance variety (2), as might also the subjects' proclivities for traveling (7). This "change of milieu" theme, according to Friedlander, is omnipresent in the favorite stories of latency-stage children and is an expression of the family-romance fantasy. Friendlander considers that

the family-romance fantasy is normally present, in conscious or unconscious form, in all latency-stage children. If Friedlander is correct, it would not be surprising for travel, even to the moon, to appeal to these subjects at a time when contemporary preoccupation with space travel had culminated in the appearance of "Sputnik," soon after the American data were gathered and just before the Finnish study was begun.

4. The recurring, mystery motif in the girls' stories may represent a characteristically feminine sexual fantasy, as is suggested by Peller (8) in another context.

In brief, simply being girls and in the latency stage may have accounted for the American and Finnish subjects' similarity in story taste. Cultural differences, such as they were, seem to have appeared in the particular story titles selected rather than in the actual characteristics of the preferred stories.

TABLE 4

FAVORITE FICTION STORIES OF AMERICAN BOYS
($N = 46$, 45.5 per cent)

Title	*Frequency*	*Title*	*Frequency*
Robinson Crusoe	4	The Flying Family	1
Danny Dunn and the Anti-Gravity Paint	3	Red Rocket	1
20,000 Leagues Under the Sea	3	Huckleberry Finn	1
Moby Dick	2	First Base Jinx	1
Lost in a Sugar Creek Blizzard	2	Super Boy	1
Broad Acres	2	The Mad Men	1
Tom Swift	2	Three Boys in a Mine	1
Mary	2	Treasure Island	1
No Children, No Pets	1	The Spirit of the Border	1
The Old Mill	1	Donnie and Company	1
A Night to Remember	1	Fun with Cemersey	1
Thirty Seconds Over Tokyo	1	Tom Sawyer	1
Tarzan	1	A Dog for Davies Hill	1
Happy Hollister	1	A Connecticut Yankee in King Arthur's Court	1
Mcellgot's Pool	1	The Yellow Phantom	1
Johnny's Space Trip	1	Barry Becomes a Star Wing Pilot	1
Boy of the Island	1	The Secret of Wildcat Swamp	1

The Boys

Fiction stories chosen by the American boys (Table 4) included several recurrent titles: *Robinson Crusoe* (4), *Danny Dunn and the Anti-Gravity Paint* (3), *Twenty Thousand Leagues Under the Sea* (3), *Moby Dick* (2), *Lost in a Sugar Creek Blizzard* (2), *Broad Acres* (2), *Tom Swift* (2), and *Mary* (2). Multiple choices of the Finnish boys (Table 5) were: the *Tarzan* stories (5), *Robin Hood*[4] (3) *Two Scouts* (3), *Sven Hankatuuli (Sailor)*

[4] Although the story of *Robin Hood* was judged by the writers to fall into the fairy tale category in classifying previously published data, it was left here in the fiction group in accordance with the decision of the Finnish classifier who thus interpreted Arbuthnot's (1) criteria.

(2), *Adventurous Island* (2), *Unknown Soldier* (2), *Hawk Eyes* (2), and the *Quintet* stories (2). Except for one American multiple-choice, *Robinson Crusoe,* which was chosen by a Finnish boy, and one Finnish multiple-choice, *Tarzan,* which was chosen by an American boy, there was no overlap in choice of story titles between the American and Finnish subjects.

TABLE 5

FAVORITE FICTION STORIES OF FINNISH BOYS
(N = 47, 78.3 per cent)

Title	*Frequency*	*Title*	*Frequency*
Tarzan Stories	5	Adventurous Castle	1
Robin Hood	3	Quintet on the Treasure Island	1
Two Scouts	3	Secret Passage of the Big Church	1
Sven Hankatuuli, (Sailor)	2	Young Cadet	1
Adventurous Island	2	By Ferry Over Enonselka	1
Unknown Soldier	2	Robinson Crusoe	1
Hawk Eyes	2	Treasure Island	1
Flying Saucer Took the Boys	1	Biggles in Africa	1
Moonlight Swimmer	1	Kalle Looping	1
Kalle, Chief Detective	1	Tom Sawyer's Adventures	1
Death in a Handkerchief	1	Count of Monte Cristo	1
Quintet Has Summer Holidays	1	The Guardian Eye	1
King Foot Ball	1	None Escaped	1
Treasure Hunters	1	Club Soldier of the Wilderness	1
Brave Troop of Horsemen	1	The Captive of the Pirates	1
Young Rebels	1	The Last of the Mohicans	1
Pertsa and Kilu on the Ship	1	Wolf Hunters and Treasure Seekers	1
Smart Wanderer	1		

The kind of fiction story chosen seemed similar for both the American and Finnish boys but, for the most part, in line with Peller's (8) notion that latency-stage, sex differences in this respect have been underestimated, *different from the girls' stories:*

1. The boys, far more often than the girls, selected stories in which the major characters were adult.
2. Regardless of age, the boys' leading characters, unlike those of the girls, were exclusively male except for the boyish little girl who fell into the well in *Mary*. In fact, regarding the sex of all story characters, regardless of story category, a strong preference for males was observed by the Finnish boys whose replies showed that, although there was no important man character in only four cases, no important boy character in 20, no important woman in 28, there was no important girl in 42 cases! The Finnish girls, in comparison, showed far less preference for same sex characters, saying that there was no important man in only 5 cases, no important boy in only 13 cases, no important woman in 5 cases and no important girl in 8 cases. (Comparable data were not obtained from the American children, studied one year previously.)

3. The boys' selections gave less attention to social competence but a different and characteristic emphasis to male, physical adequacy. Perhaps castration anxiety could be more appropriately reduced, for the boys, by identifying with heroes who were always physically adequate and often adult whereas, for the girls, fantasies of being boys, boy-like, or socially adequate, may have performed the same function.

4. The boys' stories gave little apparent attention to the mystery motif, unlike those chosen by the girls. This particular, cross-cultural sex difference supports Peller's (8) notion that, for girls in the latency stage, the mystery theme may echo a characteristically feminine fantasy.

In the boys' story selections, *one obvious similarity to stories chosen by the girls emerged:* they betrayed considerable interest in travel. This sharing by the sexes of an interest in travel supports Friedlander's conclusion that the "change of milieu" theme is characteristic of latency-stage, favorite stories but *only to this extent* supports Friedlander's contention that the latency-stage reading interests of boys and girls are not markedly different. Indeed, when the actual content of the fiction stories is considered in detail, there is still stronger support for Peller's claim for attention to latency-stage sex *differences* rather than to their *similarities.*

The Story Category Chosen Second by the Girls: Fairy Tales

Fairy tales were chosen next most often to fiction by both the American and Finnish girls (28.6 per cent and 26.7 per cent, respectively) but not by either group of boys. Chosen more than once by the American girls (Table 6) were: *Cinderella* (7), *The Wizard of Oz* (4), *Peter Pan* (2),

TABLE 6

FAVORITE FAIRY TALES OF AMERICAN GIRLS
(N = 28, 29 per cent)

Old Magic	*Total*	*New Magic*	*Total*
Cinderella	7	The Wizard of Oz	4
Sleeping Beauty	1	Peter Pan	2
Snow White and the Seven Dwarfs	1	Charlotte's Web	2
The Golden Goose Book	1	Dumbo	1
Pandora's Box	1	The Three Little Pigs	1
The Swans of Balycastle	1	Stuart Little	1
Ali Baba and the Forty Thieves	1	The Water Babies	1
The Arabian Nights	1	The Ugly Duckling	1
		The Little Lame Prince	1

and *Charlotte's Web* (2). Multiple choices of the Finnish girls (Table 7) were: *Adventurous Castle* (4), *Little Princess* (2), *Footprints Lost in the Flames* (2), and *Ulla and the Silk Rose* (2). There was no overlap between the American and Finnish girls in the fairy tale titles mentioned.

TABLE 7

FAVORITE FAIRY TALES OF FINNISH GIRLS
($N = 16$, 26.7 per cent)

Title	*Frequency*	*Title*	*Frequency*
Adventurous Castle	4	Hansel and Gretel	1
Little Princess	2	Magical Root	1
Ulla and the Silk Rose	2	Hop-O'-My-Thumb's Journey	1
Footprints Lost in the Flames	2	Little Spitfire	1
Tuula from Tower House	1	Secret Garden	1

Among the American and Finnish fairy tale choices, certain features that characterized the feminine fiction selections recurred, as follows:

1. The leading characters again tended to be orphans or to have lost one parent, usually the mother, in stories like: *Cinderella, Snow White, The Swans of Balycastle, Peter Pan, The Water Babies, The Ugly Duckling,* (American), *The Little Princess, Hansel and Gretel,* and *The Secret Garden* (Finnish).

2. The leading characters again were often multiple and far from exclusively feminine, as in *The Golden Goose, The Swans of Balycastle, The Water Babies, The Little Lame Prince,* (American), *Adventurous Castle, Ulla and the Silk Rose,* and *Hansel and Gretel* (Finnish).

3. The travel theme was less apparent than in the fiction stories but did reappear in *The Wizard of Oz, Peter Pan,* (American), *Adventurous Castle,* and *Hop-O'-My-Thumb's Journey,* (Finnish).

4. The mystery motif, except in *Pandora's Box* (American) and *The Secret Garden* (Finnish), seemed to be less prevalent. But another theme, perhaps also representing a sexual fantasy characteristically feminine, appeared: with considerable frequency, someone small, inadequate, suffering, or helpless triumphed over someone stronger or older, usually male, in *The Water Babies, The Ugly Duckling, Stuart Little, The Three Little Pigs, Charlotte's Web, The Golden Goose Book,* (American), *The Little Princess, Ulla and the Silk Rose,* and *Hop-O My-Thumb's Journey,* (Finnish). Likewise, someone feminine was the real power behind a male figure as with the slave girl in *Ali Baba and the Forty Thieves* (American) and Ulla with the crippled boy in *Ulla and the Silk Rose* (Finnish), while in *Peter Pan, Dumbo,* and *The Ugly Duckling* (American) the leading characters unexpectedly acquired the power of flying, though not this time to the moon.

The Story Category Chosen Second by the Boys: Information

Boys from both the American (Table 8) and Finnish (Table 9) groups selected informational material next in order of frequency to, but to considerably less degree (Americans, 17.8 per cent; Finns, 13.3 per cent) than fiction. The character of the information sought seemed, for the most part, to be about other places, other peoples, other times, animals, and vocations

TABLE 8

FAVORITE INFORMATION STORIES OF AMERICAN BOYS
($N = 18$, 17.8 per cent)

Title	*Frequency*	*Title*	*Frequency*
Burgess Animal Book	2	All About the Weather	1
Tales and Travel	1	The Story of Our Country	1
World Book	1	The Story of the F.B.I.	1
The Science World	1	Pre-Historic America	1
Baseball Round-Up	1	All About Dinosaurs	1
Favorite Animals of America	1	West Point Story	1
The Story of New Jersey	1	The Hudson Bay Company	1
Your People and Mine	1	The Nature Library of Butterflies	1
The U.S. Marines	1		

as in: *The Hudson Bay Company* (American) and *Atorox in the Moon* (Finnish); *Your People and Mine* and *With a Submarine Around the World; Pre-Historic America* and *The War of Troia; All About Dinosaurs* and *An Adventure on the Sea Bottom; The U.S. Marines* and *Parcel Delivery Business Pamaos.* Though more oriented toward the factual, these choices recalled the boys' fiction selections because of their reference to physical prowess, masculine assertion, and travel.

The fact that the boys from both cultures chose stories in the information category, next after fiction, whereas the girls chose fairy tales, suggests that sex differences here prevailed over cultural differences. The greater masculine than feminine preference for information material is consistent with traditional findings that boys show more interest than girls in general information. It implies that, in both the American and Finnish cultures, there may be more pressure or more precedent for the male acquisition of information and less indulgence of masculine than of feminine inclinations toward the magical, fairy-tale world. Or perhaps, regardless of culture, there is a greater innate masculine curiosity or greater masculine drive actively to satisfy what curiosity is present.

TABLE 9

FAVORITE INFORMATION STORIES OF FINNISH BOYS
($N = 8$, 13.3 per cent)

Title	*Frequency*	*Title*	*Frequency*
With a Submarine Around the World	2	Atorox in the Moon	1
The Wide World	1	Search of Captain Grant	1
Parcel Delivery Business Pamaos	1	An Adventure on the Sea Bottom	1
The War of Troia	1		

The Other, Less Popular Story Categories: Girls and Boys

The *girls'* interest was slight in the remaining story categories. Such as it was, however, it seemed to reveal some, slight cultural differences as to choice of story categories. Despite the initial, cross-cultural consistency of all the girls, in choosing first fiction and then fairy tales, the Americans now gave third and fourth places, respectively, to animal stories (13.3 per cent) and biography (6.1 per cent) whereas the Finns placed information stories (13.3 per cent) third and animal stories (8.3 per cent) fourth. Religious stories were named by one American but no Finnish girl.

The *boys'* interest, too, was small in the story categories chosen next after fiction and information stories, ranked first and second, respectively, by both groups. Third and fourth places were given by the American boys to biography (14.9 per cent) and to fairy tales (9.9 per cent), but they did not choose any religious story. For the Finnish boys, the animal, biography, and religious categories each received 1.7 per cent of the choices.

Thus, the subjects, at first glance, seemed, in choosing these infrequently selected story categories, to show slight cultural differences *within* the sex groups. However, in the writers' opinion, these apparent cultural differences do not warrant serious discussion since, involving such a small number of choices, they may have arisen simply from differences in size of the American and Finnish samples. Or possibly they occurred spuriously because of minor variations in interpreting the story-classification criteria between the writers, who categorized stories chosen by the American children, and the Finnish-speaking classifiers of the Finnish stories. Particularly, such classification differences might have occurred with the biographical material; selected and semifictionalized for presentation to this age group, its classification as either fiction or biography was sometimes arbitrary when a clear precedent was lacking for a specific story. Just this sort of difference might partly account for the apparent discrepancies in the extent to which American and Finnish boys made fiction their most frequently chosen story category and also the extent to which they chose biography.

A Statistical Look at the Choice of Story Category

Regarding the subjects' tendency to choose stories that fell into a certain story category, the following rank order correlations were obtained:

American Girls vs. Finnish Girls	.91
American Boys vs. Finnish Boys	.81
American Girls vs. American Boys	.74
Finnish Girls vs. Finnish Boys	.76

Thus, cross-culturally, the correlations between like-sex groups, especially for the girls, were higher than the correlations between opposite-sex groups within the same culture. This finding is consistent with the writers' previ-

ously described, qualitative impression that cross-cultural, same-sex similarities were greater than same-culture, opposite-sex similarities as to the kind of story chosen *within* the same (fiction) category.

Since *all* of the above rank-order values were significant at beyond the 1 per cent level, then, regarding choice of story category, these children nevertheless showed considerable homogeneity regardless of their cultural or sex group membership. It could not be determined from the data whether this sort of homogeneity would stem from intrinsic, developmental-stage similarities, regardless of sex or culture; from cross-culturally similar educational and social expectations of both sexes at this age; from the somewhat similar natures simply of the story repertoire provided the subjects of both sexes in the two cultures; or otherwise.

A Search for Sources of Story Homogeneity Regardless of Story Category

An effort was made to determine whether the previously described trend toward homogeneity in choice of story category might stem from features common to *all* the stories by studying all the subjects' responses to the question, "What did you like most about the story?" without reference to related story titles, story categories, or apparent story content. A number of subjects mentioned more than one reason for preferring the favorite story. Since these multiple reasons often seemed to be related to one another, they were considered as equally important; they fell readily into 18 major categories (Table 10, Girls; Table 11, Boys).

TABLE 10

WHAT DID YOU LIKE MOST ABOUT THE STORY? GIRLS

Theme	*Per Cent*	*Rank*
Adventure, Excitement, Thrills, Pursuit, Danger, and Escape	24.5	1
Home, Family, and School	11.4	2
Friendship, Helpfulness, and Kindness	9.2	3
Humor and Comical Enjoyment	8.7	4
Subterfuge and Surprise: Tricks, Secrets, and Magic	7.1	5
Interesting Because of Characters, Style, or Illustration	6.0	6.5
Mystery	6.0	6.5
Sadness, Death, Poverty, Orphanhood, Separation, and Worry	5.4	8
Overcoming Odds Through Intelligence, Alertness, and Ingenious Behavior	3.8	9.5
Information and Travel	3.8	9.5
Discovery	3.3	11
Love, Happiness, Marriage, and Clothes	2.7	13
Strength, Bravery, and Spiritedness	2.7	13
Hunting, Fighting, Murder, War, and Cruelty	2.7	13
Animal	1.1	15.5
Happy Ending	1.1	15.5
No Response	.5	17
Miscellaneous	0	18

TABLE 11

WHAT DID YOU LIKE MOST ABOUT THE STORY? BOYS

Theme	*Per Cent*	*Rank*
Adventure, Excitement, Thrills: Pursuit, Danger, Escape	22.8	1
Hunting, Fighting, Murder, War, Cruelty	10.7	2.5
Information and Travel	10.7	2.5
Subterfuge and Surprise: Tricks, Secrets, and Magic	10.2	4
Overcoming Odds Through Intelligence, Alertness, and Ingenious Behavior	9.7	5
Interesting Because of Characters, Style, or Illustrations	6.3	6
Humor and Comical Enjoyment	5.3	7
Friendship, Helpfulness, Kindness	4.9	8.5
No Response	4.9	8.5
Strength, Bravery, and Spiritedness	4.4	10
Discovery	2.4	11
Home, Family, and School	1.5	13.5
Sadness, Death, Poverty, Orphanhood, Separation, and Worry	1.5	13.5
Mystery	1.5	13.5
Animal	1.5	13.5
Happy Ending	1.0	16
Love, Happiness, Marriage, and Clothes	.5	17.5
Miscellaneous	.5	17.5

Both the *girls* (24.5 per cent) and the *boys* (22.8 per cent) showed strikingly similar and strong *first* preference for story themes which were "Exciting and Thrilling: Pursuit, Danger and Escape." Whether or not the girls and boys differentially projected themselves into the roles of pursued and pursuer was not evident.

The *girls*, unlike the *boys*, gave second and third ranks to story traits clearly related to the theme of positive and supportive social relationships: Home, Family, and School (11.4 per cent) and Friendship, Helpfulness, and Kindness (9.2 per cent). Unlike the girls, the *boys* next gave their joint attention (rank 2.5; 10.7 per cent) to themes of self-assertion through physical or intellectual prowess: Hunting, Fighting, Murder, War and Cruelty, and Information and Travel.

The *girls* ranked as *fourth* Humor and Comical Enjoyment (8.7 per cent) and as *fifth* Subterfuge and Surprise: Tricks, Secrets, and Magic (7.1 per cent), as if again betraying an interest in social situations but, this time, those more concerned with subtle and acceptable forms of social dominance. It is interesting that the *boys* gave *fourth* rank to Subterfuge and Surprise: Tricks, Secrets, or Magic (10.2 per cent), perhaps also because of an interest in subtly achieved social dominance, but then displayed a somewhat more open, probably more realistic, interest in a means to accomplish this end by giving a close *fifth* place to Overcoming Odds Through Intelligence, Alertness, or Ingenious Behavior (9.7 per cent).

Both girls (rank 6.5; 6 per cent) *and boys* (rank 6.0; 6.3 per cent) gave similar attention to story-traits that were Interesting Because of Characters, Style, or Illustration.

For the *girls,* of equal importance to Interesting Because of Characters, Style, or Illustrations was Mystery (rank 6.5; 6.0 per cent) which, contrastingly for the boys (rank 13.5; 1.5 per cent), was farther down the list. For the girls, *eighth* place was then given to Sadness, Death, Poverty, Orphanhood, Separation, and Worry (5.4 per cent) as if to reveal concern for the traditionally feminine themes of masochism, dependency, and child care. Overcoming Odds Through Intelligence, Alertness, and Ingenious Behavior (3.8 per cent) and Information and Travel (3.8 per cent), both mentioned considerably earlier by the boys, were given a ranking *half way between ninth and tenth* positions by the girls.

Although these responses now involve such small percentages for a given story-trait, the pattern of sex differences remains interesting, for example, regarding social compliance. Thus, the *boys* somewhat belatedly mentioned two story traits, previously ranked higher by the girls: Humor and Comical Enjoyment (Girls: rank 4; 8.7 per cent; Boys: rank 7; 5.3 per cent) and Friendship, Helpfulness, and Kindness (Girls: rank 3; 9.2 per cent; Boys: rank 8.5; 4.9 per cent). Compared to the girls, the boys again seemed less inclined toward social compliance in giving No Response (Girls: rank 17; .5 per cent; Boys: rank 8.5; 4.9 per cent) and in referring to Strength, Bravery, and Spiritedness (Girls: rank 13; 2.7 per cent; Boys: rank 10; 4.4 per cent).

Discovery was ranked *eleventh* by both girls (3.3 per cent) and boys (2.4 per cent).

The *girls* gave equal rank and attention (rank 13; 2.7 per cent) to three motifs: Love, Happiness, Marriage, Clothes—mentioned by the boys, later (rank 17.5) and also infrequently (.5 per cent); Strength, Bravery, and Spiritedness; and Hunting, Fighting, Murder, War and Cruelty, the last two of which were mentioned previously and comparatively more often by the boys (4.4 per cent and 10.7 per cent, respectively).

Sex differences continued to be apparent with those story traits mentioned by less than 2 per cent of the subjects as follows. For the *girls,* these categories were relatively few in number: Animal and Happy Ending (1.1 per cent), No Response (.5 per cent) and Miscellaneous (0 per cent). For the *boys,* they were comparatively more numerous, indicating their almost total lack of interest in some popular feminine themes: Home, Family, and School; Sadness, Death, Poverty, Orphanhood, Separation, and Worry; Mystery; and Animal (1.5 per cent); Happy Ending (1.0 per cent); and Love, Happiness, Marriage, and Clothes and Miscellaneous (.5 per cent).

This apparently small interest by the girls in Love, Happiness, Marriage, and Clothes is probably consistent with their being in the latency-stage but, even so, their attention to this traditionally feminine theme is considerably greater than that of the boys (Girls: 2.7 per cent; Boys: .5 per cent).

The fact that the Happy Ending is so seldom volunteered as an important story feature may indicate that the latency-stage story repertoire

tends to be limited to stories with this kind of ending. If so, the subjects might have taken happy endings so much for granted that the story features which were then considered important were those that proved more variable.

Regarding the tendency to name a story feature which fell into one of the above categories, the following rank order correlations were obtained:

American Girls vs. Finnish Girls	.60
American Boys vs. Finnish Boys	.62
American Girls vs. American Boys	.34
Finnish Girls vs. Finnish Boys	.45

Here again, while all the correlation coefficients were significant beyond the 1 per cent level implying some total-group homogeneity, the resemblance between same-sex groups, cross-culturally, proved to be greater than that between same-culture but opposite-sex groups.

The Age of Encountering the Preferred Story

When asked at what age they first encountered the preferred story, both American and Finnish subjects reported a modal age of 10 years for both sex groups (Table 12). The median ages were as follows: American

TABLE 12

AGE OF FIRST HEARING OF FAVORITE STORY

	GIRLS				BOYS				TOTAL				TOTAL				Grand Total	
	Amer.		*Finn.*		*Amer.*		*Finn.*		*Amer.*		*Finn.*		*Girls*		*Boys*			
Age in Years	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
1	—	—	—	—	1	1.0	—	—	1	.5	—	—	—	—	1	.6	1	.3
2	—	—	—	—	1	1.0	—	—	1	.5	—	—	—	—	1	.6	1	.3
3	1	1.0	—	—	—	—	—	—	1	.5	—	—	1	.6	—	—	1	.3
4	5	5.1	—	—	1	1.0	—	—	6	3.0	—	—	5	3.2	1	.6	6	1.9
5	2	2.0	1	1.7	2	2.0	1	1.7	4	2.0	2	1.7	3	1.9	3	1.9	6	1.9
6	2	2.0	1	1.7	6	5.9	2	3.3	8	4.0	3	2.5	3	1.9	8	5.0	11	3.4
7	11	11.2	2	3.3	8	7.9	2	3.3	19	9.6	4	3.3	13	8.2	10	6.2	23	7.2
8	10	10.2	3	5.0	9	8.9	7	11.7	19	9.6	10	8.3	13	8.2	16	9.9	29	9.1
9	27	27.7	9	15.0	28	27.7	8	13.3	55	27.6	17	14.2	36	22.8	36	22.4	72	22.6
10	34	34.7	19	31.7	35	34.7	21	35.0	69	34.7	40	33.3	53	33.5	56	34.8	109	34.2
11	5	5.1	21	35.0	4	4.0	14	23.3	9	4.5	35	29.2	26	16.5	18	11.2	44	13.8
12	1	1.0	2	3.3	1	1.0	2	3.3	2	1.0	4	3.3	3	1.9	3	1.9	6	1.9
No Response	—	—	2	3.3	5	5.0	3	5.0	5	2.5	5	4.2	2	1.3	8	5.0	10	3.1
Total	98		60		101		60		199		120		158		161		319	
Median	8.8		9.8		9.6		9.9		8.7		9.9		9.6		9.6		9.6	

girls, 8.8 years; American boys, 9.6 years; Finnish girls, 9.6 years; and Finnish boys, 9.9 years. It appeared that, despite slight differences in chronological age, the median ages for encountering the preferred story seemed to be similar. In any case, most of the subjects selected their favorite stories from the present or from the recent past, perhaps discarding as already too babyish the stories from a slightly earlier period.

Since so many of the stories chosen were classified as fiction, it was difficult to determine whether there was a true differential as to the age at which the subjects encountered stories from a particular category. However, at least with the *American girls,* it appeared that the fairy tale choices stemmed from an earlier period than did the fiction selections. Thus, American girls who chose fairy tales were more often in Grade 4 ($N = 20$) than in Grade 5 ($N = 8$) whereas the differences, for fiction, though slight, were in the opposite direction so that the girls who chose fiction were slightly more often in Grade 5 ($N = 24$) than in Grade 4 ($N = 19$). With *American boys,* it seemed that informational stories were more likely to be chosen by the Grade 5 ($N = 12$) than by the Grade 4 ($N = 6$) boys whereas fiction, though chosen almost equally often by boys in both grades, was slightly more often selected by boys in Grade 4 ($N = 24$) than in Grade 5 ($N = 22$). The Finnish data did not readily lend itself to the checking of grade-location against choice of story category.

With the American fiction choices, it was interesting that the few boys who resembled the girls in their choice of an obvious mystery story tended to be in Grade 4 rather than in Grade 5 though slightly more Grade 5 than Grade 4 girls chose an obvious mystery story. Grade 4 boys resembled girls in general more than did Grade 5 boys in their choice of a story clearly involving travel. Thus, casual observation of the story choices would suggest that Grade 4 boys chose stories superficially more like those of the girls than did boys in Grade 5.

The Story Ending

When asked, the great majority of the subjects indicated (Table 13) that their story had a happy resolution (American girls, 91 per cent; Finnish girls, 93 per cent; American boys, 73 per cent; and Finnish boys, 80 per cent). Thus, cross-culturally, the girls mentioned happy endings more often than did the boys as if they were more inclined either to choose a story with such an ending or to admit doing so. The American boys were least inclined to choose, or to admit choosing, a story with a happy ending. Consistently, they were also the most likely to say that they could not answer the question, or simply to ignore it, compared to the other groups (American girls, 2 per cent; Finnish girls, 5 per cent; American boys, 11 per cent; Finnish boys, 3 per cent). The children, therefore, seemed generally to prefer stories with happy endings. Or perhaps they had been so restricted to stories with this kind of ending that their responses were thus necessarily biased.

TABLE 13

TYPE OF STORY ENDING

	Girls				Boys				Total				Total		Total		Grand Total	
	Amer.		Finn.		Amer.		Finn.		Amer.		Finn.		Girls		Boys			
Story Ending	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Happy	89	90.8	56	93.3	74	73.3	48	80.0	163	81.9	104	86.6	145	91.8	122	75.8	267	83.7
Unhappy	7	7.1	1	1.7	16	15.8	10	16.7	23	11.6	11	9.2	8	5.1	26	16.1	34	10.7
No Response or Neither	2	2.0	3	5.0	11	10.9	2	3.3	13	6.5	5	4.2	5	3.2	13	8.1	18	5.6
Total	98		60		101		60		199		120		158		161		319	

Did the Story Have Pictures?

Considerably more Finnish children (girls, 55 per cent; boys, 47 per cent) reported that their preferred story had no pictures (Table 14) than did the Americans (girls, 8 per cent; boys, 18 per cent). With the Finns,

TABLE 14

DID THE STORY HAVE PICTURES?

	Girls				Boys				Total				Total		Total		Grand Total	
	Amer.		Finn.		Amer.		Finn.		Amer.		Finn.		Girls		Boys			
Pictures	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Black and White	42	42.8	24	40.0	44	43.6	29	48.3	86	43.2	53	44.2	66	41.8	73	45.3	139	43.6
Colored Pictures	30	30.6	1	1.7	22	21.8	3	5.0	52	26.1	4	3.3	31	19.6	25	15.5	56	17.5
Colored and Black and White	18	18.4	2	3.3	17	16.8	—	—	35	17.6	2	1.7	20	12.7	17	10.6	37	11.6
No Pictures	8	8.2	33	55.0	18	17.8	28	46.7	26	13.1	61	50.8	41	25.9	46	28.6	87	27.3
Total	98		60		101		60		199		120		158		161		319	

colored pictures were relatively less numerous (girls, 2 per cent; boys, 5 per cent) than with the Americans (girls, 31 per cent; boys, 22 per cent), as were the mixtures of colored and black-and-white pictures (Finnish girls, 3 per cent; boys, 0 per cent) (American girls, 18 per cent; boys, 17 per cent). However, reversing the pattern, the incidence of black-and-white pictures was about the same for the Finnish children (girls, 40 per cent; boys, 48 per cent) as for the Americans (girls, 43 per cent; boys, 43 per cent).

The trend of the differences suggests that, for some reason, the Finnish children (a) encountered fewer stories that were illustrated, at least in color, or (b) were less influenced in story choice by the presence or chromatic character of illustrations than were the American children. The most economical explanation may be some differential practice by Finnish as opposed to American publishers, perhaps because of wartime or economic stringencies, in the use of illustrations for children's books, especially colored illustrations.

On the other hand, it is possible that Finnish adults or children may not value the visual representations, or their being colored, as highly as the Americans. In this connection, causal observation suggests that in Finland clothing and the environment, both natural and manmade, tend more toward the subdued or subtle in color than in the United States. Whether this is a real cultural difference, stemming from financial expediency, color experience, aesthetic taste, emotional controls, or unknown factors, is here a matter for mere conjecture. However, cultural differences in emotional pattern might be partly involved since the Finnish child appears to be less given to, or to be less permitted, the outward expression of his feelings in social situations than does his American counterpart. Takala and Takala (9), in comparing Finnish with American children's reactions to frustration, observed that, while the American attitude toward children is nonauthoritarian and nonthreatening, leading to spontaneous and nonanxious behavior in the American child, the Finnish attitude, while nonthreatening, is authoritarian, and the behavior of the Finnish child is somewhat aggressive, only partly spontaneous, but not very anxious.

Who Else Liked the Story?

Siblings or other peers were named by all groups as also liking their preferred story far more often than were parents or other relatives. This suggests that the subjects, generally, were more influenced in their story choices by the taste of their contemporaries than by that of older persons (Table 15). This one might expect of latency-stage children.

The Finnish children, especially the boys, more often ignored this question, or replied that they did not know, than did the American children. Likewise, the Finns, especially the boys, ascribed the same story preference less often than did the Americans to siblings and peers but especially to parents and other relatives (American girls, 14.3 per cent; American boys, 16.8 per cent; Finnish girls, 6.6 per cent; Finnish boys, 3.3 per cent). Thus, compared to the Americans, the Finnish children, especially the boys, apparently were, or saw themselves as, more independent of others' influences, especially the influence of adults. The American girls and boys in this respect resembled one another.

Possibly the Finnish children, older than the Americans, were simply closer to preadolescence and thus to some normal rebellion against authority figures and their influence. Or perhaps, living in the more authoritarian

TABLE 15

WHO ELSE LIKED THE STORY?

Others Who Liked Story	GIRLS				BOYS				TOTAL				TOTAL				Grand Total	
	Amer.		Finn.		Amer.		Finn.		Amer.		Finn.		Girls		Boys			
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Adults																		
Parents	8	8.2	2	3.3	10	9.9	2	3.3	18	9.0	4	3.3	10	6.3	12	7.5	22	6.9
Miscellaneous Relatives	6	6.1	2	3.3	7	6.9	—	—	13	6.5	2	1.7	8	5.1	7	4.3	15	4.7
Total	14	14.3	4	6.6	17	16.8	2	3.3	31	15.5	6	5.0	18	11.4	19	11.8	37	11.6
Peers																		
Peers—same sex	22	22.4	18	30.0	27	26.7	11	18.3	49	24.7	29	24.2	40	25.3	38	23.6	78	24.4
Peers—opposite sex and both	31	31.6	15	25.0	25	24.8	4	6.7	56	28.1	19	15.8	46	29.1	29	18.0	75	23.5
Siblings	14	14.3	6	10.0	10	9.9	12	20.0	24	12.1	18	15.1	20	12.7	22	13.7	42	13.2
Total	67	68.3	39	65.0	62	61.4	27	45.0	129	64.9	56	55.1	106	67.1	89	54.3	195	61.1
No Response—none	17	17.3	17	28.3	22	21.8	31	51.7	39	19.6	48	40.0	34	21.5	53	52.9	87	27.3
Total	98		60		101		60		199		120		158		161		319	

family setting ascribed to them by the Finnish psychologists, Takala and Takala (9), they were inclined to be more frustrated, more aggressive, and therefore to rebel more against the influence of others, especially of authority figures.

SUMMARY AND CONCLUSIONS

The favorite stories of grade school children from two countries, an American group composed of 98 girls and 101 boys and a Finnish group composed of 60 girls and 60 boys, were examined to assess and compare cultural and sex differences of story preferences during the latency stage. Presumably most of the subjects were in the latency stage since the average age of the American girls and boys was 8.9 years and 10.1 years, respectively, and 11.1 years for both the Finnish girls and boys.

Each child was asked by his teacher to complete a questionnaire concerning his favorite story, certain features of the story, and the circumstances of first encountering it. In addition, he was asked to summarize the story in his own words. Grouped on the basis of Arbuthnot's classification system, the stories fell into the categories of fiction, fairy tales, information, biography, animal, and religious stories. On the basis of a

qualitative and statistical analysis of the data, the following conclusions appear to be warranted:

1. *There appeared to be no one generally popular story.*

2. *There was, however, a generally preferred kind of story.* The subjects, regardless of their membership in one or another sex or cultural group, clearly preferred stories in the fiction category over fairy tales, information, biographical, animal, or religious stories.

3. Regardless of story category, the subjects seemed particularly to like stories about travel and about exciting, dangerous pursuit and escape; stories whose interest was heightened by particular characters, illustrations, or style; and stories about social situations involving subterfuge and surprise, or humor and comical enjoyment, in about that order. The general preference for tales of travel supports Friedlander's notion that in the latency stage the "change of milieu" theme is especially popular, perhaps as an expression of the family romance fantasy. The strong appeal of the exciting pursuit and escape motif might represent a reaction against the probably less exciting and more obvious didactic kind of story likely to be presented to American children of this age (3), and perhaps also to Finnish children. In any case, the fact that both sexes seemed to share a preference not only for tales of travel but of exciting pursuit and escape; of interesting characters, illustrations and style; and, to some extent, of subterfuge and humor partially supports Friedlander's claims for latency-stage similarities in reading interest between the sexes. Certainly these similarities in reading taste, not only between the sexes but cross-culturally, bear out psychoanalytic assumptions that the latency-stage child turns his attention to all kinds of learning, including that about people, places, and social relationships.

4. All groups apparently tended similarly to select the favorite story from those recently encountered and in accord with the taste of their peers rather than of their elders.

5. Happy endings were usually attributed to the preferred stories but were apparently not considered especially important or, perhaps, unlikely.

6. Beyond the general similarities in story taste just described, the data further show, *even cross-culturally, sex differences* far greater than Friedlander apparently recognized—perhaps because her clinical sample was deviant or small and her impressions about nonclinical cases were based on a study by someone else not psychologically oriented. Thus, the *girls, unlike the boys,* chose fairy tales next in order of frequency to fiction but, about both the fiction and fairy tale selections, there were several highly characteristic features seldom observed in the favorite stories of the boys: (a) The leading characters tended to be of the same age as the subjects or only slightly older. (b) These characters were often multiple, orphaned, of interchangeable appearance, and male. (c) The most obvious story themes were of mystery; of positive and cooperative social relationships with siblings, schoolmates or friends of either sex; and of small helpless children or animals who triumphed over stronger, older, usually male

characters, sometimes, unexpectedly requiring the power of flight. In their own words, the girls attributed special importance in their favorite stories to these motifs: Home, Family, and School; Friendship, Helpfulness, and Kindness; Mystery; Sadness, Death, Poverty, Orphanhood, Separation, and Worry; and Love, Happiness, Marriage, and Clothes.

7. *The boys, unlike the girls,* chose information stories next in order of frequency to fiction but, in fiction and information selections alike, there were characteristic features which seldom occurred in the favorite stories of the girls: (a) The leading characters tended to be older than were the subjects and usually adult. (b) Though sometimes multiple and of interchangeable appearance, these characters tended to be solitary and almost invariably male. (c) The most obvious story themes were of remarkable physical adequacy or of intellectual adequacy reinforced by information, often gained through travel, about other places, other peoples, other times, animals, and vocations. Unlike the girls, the boys expressed special interest in story features pertaining to Hunting, Fighting, Murder, War, and Cruelty; Information and Travel; Overcoming Odds Through Intelligence, Alertness, and Ingenious Behavior; and Strength, Bravery, and Spiritedness. The possible implications of these differences were discussed.

Qualitatively and statistically, the data lend very strong support to Peller's belief that latency-stage sex differences in reading interests have been underestimated. Stemming as they do from a psychologically oriented effort to gather actual data on this question from nonclinical cross-cultural populations, the writers view them as scarcely final but apparently unique.

References

1. Arbuthnot, May H. *Children and books.* (Rev. Ed.) New York: Scott, Foresman, 1957.
2. Burlingham, Dorothy T. The fantasy of having a twin. *Psychoanal. Study Child,* 1945, 1, 205-210.
3. Child, I. L., Potter, E. H., & Levine, Estelle M. Children's textbooks and personality development: an exploration in the social psychology of education. *Psychol. Monogr.,* 1946, 60, No. 3 (Whole No. 279).
4. Collier, Mary J., & Gaier, E. L. Adult reactions to preferred childhood stories. *Child Develpm.,* 1958, 29, 97-103.
5. Collier, Mary J., & Gaier, E. L. Preferred childhood stories of college women. *Amer. Imago,* 1958, 15, 401-410.
6. Collier, Mary J., & Gaier, E. L. The hero in the preferred childhood stories of college men. *Amer. Imago,* 1959, 16, 177-194.
7. Friedlander, Kate. Children's books and their function in latency and prepuberty. *Amer. Imago,* 1942, 3, 129-150.

8. Peller, Lili. Reading and daydreams in latency, boy-girl differences. *J. Amer. Psychoanal. Ass.*, 1958, 6, 57-70.

9. Takala, Annika, & Takala, M. Finnish children's reactions to frustration in the Rosenzweig test: an ethnic and cultural comparison. *Acta Psychol.*, 1957, 13, 43-50.

CHILDREN'S ART ABILITIES: THE INTERRELATIONS AND FACTORIAL STRUCTURE OF TEN CHARACTERISTICS

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Children's art has served for a variety of studies, most of them in areas not directly concerned with art as such, e.g., intelligence, motor coordination, etc. However, certain aspects of children's art touch upon the general problem of abilities in the arts and deserve study in their own right. More specifically, the study of unusual art abilities in children may shed light upon characteristics of unusual artistic abilities when they occur in the adult.

In this paper data are being used that were collected in one among several experiments carried out during the years 1935 to 1940 at the Cleveland Museum of Art for the purpose of investigating some aspects of children's art abilities. In order to observe children's ability in color drawing, 1015 children of the Museum's Saturday classes, aged 6 to 15, from all parts of Greater Cleveland, were asked to make pictures on topics given to them. There were approximately 50 boys and 50 girls at each age level, with only minor variations. Some analyses and results from these observations have been discussed in earlier publications (7, 8).

Inspection of these data shows that some characteristics of children's drawings tend to appear together, others appear to be independent of one another. The study reported here is an attempt to identify and interpret the essential components involved in these observed relationships.

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The frame of reference for this study of children's art is based on characteristics that appear to be of importance also in adult art, though on a different level and to a different degree.

"Drawing 4" was chosen from data concerning several drawings on different topics; its topic, "Make a picture showing what you would like to do next summer," permitted greater variety and freedom than others for the display of the characteristics in question, especially Use of Color, Grouping, and Motion. From the characteristics recorded by the original panel of judges[2] 10 were selected for use in this study.

Description of the 10 Characteristics Chosen for Study

The 10 characteristics selected are as follows:

Representational Stage (R) refers to the manner of representing pictorially people, objects, nature, and activities and dynamic processes of various kinds. Representational Stages constitute a continuum, starting with the first scribble of small children which are, at this stage, unintelligible to adults; the next stage is one of schematized shapes that are barely recognizable and often subject to misinterpretation unless fitted with a proper explanation by the child; this turns eventually into a well defined system of schemata; from there, by degrees and often unevenly, the schemata are converted into shapes and units that are "true-to-appearance," thus resembling realistic adult art forms; and in the last stage the true-to-appearance representation includes three-dimensionality in the shape of line perspective and foreshortening. As a process, the developmental stages of characteristic R proceed step by step in the direction indicated and are not, in general, reversible, unless one deals with an anomalous condition. Few children seem to reach the "perspective" stage of representation. The ability involved in characteristic R is clearly tied up with the sense of vision and the ability to use it. "Vision," in this context, cannot be comprehended in a purely perceptive sense, e.g., perceiving a given color, but as the complex skill of analyzing and then selectively rendering experiences by means of favoring all that lends itself to a predominantly visual presentation, and by excluding or purposely suppressing any or all interfering sense-mixed impressions of a different nature, e.g., sound (5, p. 86).

Color Use (Col) refers to the use of color crayons which were the given medium for the drawings. A large number of categories were set up to describe the use of color from the following points of view: actual color of real objects, described as "true local color," e.g., a blue for sky, a green for grass or leaves, etc., and "variation of local colors," e.g., several shades of green for grass or leaves, multicoloredness, brilliancy of color, contrast, hues and tints, compositional color arrangements for specific effects.

[2] The recording of characteristics was carried out by Lark-Horovitz, Barnhart, Harding, and Sills, under supervision of Lark-Horovitz.

Grouping (Gr) refers to three or more figures or objects supposedly related. Grouping may be "organized," e.g., show a certain pictorial relationship beyond a narrative content; it may be well organized or remarkably well organized, depending on the degree of its coordination and cohesion within the composition.

Intentional Asymmetry (As) refers to a purposeful avoidance of use of the central or near-central axis in composition and to accentuation of calculated, yet balanced irregularity.

Intentionally Indefinite Shapes (Sh) refer to purposeful blurring or haziness of shapes in contrast to clearly defined shapes, coupled with at least average coordination and skill in the use of medium.

Resemblance to Style (St) refers to a tendency toward selecting or omitting characteristics otherwise used in order to imply a certain style, e.g., expressionistic or impressionistic.

Motion (Mo) refers to any representation that attempts, indicates, or carries through the feeling of motion, whether by means of positional differences caused by movement, e.g., bending of arm or leg, of symbolic indications, e.g., lines or arrows, or of a particular or suggestive technique of the medium, e.g., curviness of lines.

Use of Medium (Med) refers to the consistent (or inconsistent) use of the medium (here, color crayons or pencil); "consistent" uses are all possible uses which are compatible with the nature of color crayons, their bluntness of lines, possible smoothness, brilliancy, or roughness which can be achieved for solid areas.

Area Treatment (Ar) refers to the manner of treating small or large areas with color crayons or pencil which can vary from ragged and smudgy areas to smooth, boldly brilliant, contrasty, blending, or textured areas.

Line Treatment (L) refers to the use of lines, multicolored or monochrome, made by color crayons or pencil and which may appear to be hesitating, weak, decisive, bold, subtle, delicate, or decorative, e.g., rhythmic repetition of lines.

The data, as originally recorded, followed definitions set up for various characteristics that were agreed upon in detail by the original panel of judges.[2] Each drawing was rated, either in terms of the degree in which a characteristic appears, as in the case of four degrees of Use of Medium: inconsistent, consistent, consistent with moderate effectiveness, consistent with remarkable effectiveness; or in terms of different manifestations of a characteristic, as in the case of Shape: clearly defined, purposefully blurred; or both, as in the case of Representation.

In this study the 10 characteristics were each divided into two categories to provide the variables for the analysis. One category was called "indifferent," the other category was called "remarkable."

The term "indifferent" was chosen to describe a form or degree of occurrence of the given characteristic which did not contribute to an esthetic effect or to an artistic quality of the drawing. "Indifference" on a given

TABLE I

DICHOTOMY AND DEFINITIONS FOR EACH OF THE TEN CHARACTERISTICS

Characteristic and Symbol	*Indifferent*	*Remarkable*
Representation (R)	Primitive schema; schema; mixed stage; true-to-appearance	True-to-appearance plus perspective
Use of Color (Col)	Multicoloredness; brightness; "true" color; variation of "true" colors	Brilliancy and contrast; color-organization; subtle blending
Grouping (Gr)	Three or more figures or objects set apart at random or aligned without any other relationship except possibly that of content	Three or more figures or objects interrelated by means of a balanced arrangement; color integration or spatial cohesion
Intentional Asymmetry (As)	Centered; off center; symmetrical or near-symmetrical; haphazard placement	Purposeful asymmetric arrangement with stability in the irregular placement
Intentionally Indefinite Shapes (Sh)	Clearly outlined; defined against light, paper-ground or colored areas; hesitating or ragged outline	Outline hazy, blending into background or neighboring areas with the intention of a special pictorial effect
Resemblance to Style (St)	Suggesting vaguely a style of painting or drawing that is "naturalistic" or "realistic" or contains "decorative elements"	Suggesting a specific style in painting such as "Impressionism" or some particular form of "Expressionism," e.g., definite distortions, abstraction, or color unification
Motion (Mo)	Indication of or attempt at motion of animated or inanimate objects, but unsuccessfully carried through; or intelgible only by symbols or signs	Slight or considerable motion but successfully presented by a diversity of pictorial means such as representation of a definite actual movement, color-or-line-treatment
Use of Medium (Med)	Inconsistent use; mere consistency; moderately effective use	Consistent but also remarkably effective use of medium, whether in colors or monochrome
Area Treatment (Ar)	Ragged or smudgy; smooth or very smooth; thick; thin	Bold; blended; graded; textured
Line Treatment (L)	Hesitant or ragged; decisive but without further characteristics; short or long; weak	Bold; subtle; delicate

characteristic may be "usual" in the sense that a majority of children display this particular form or degree of the characteristic, but relative frequency of occurrence is not part of the definition.

The other category for each characteristic was called "remarkable" in order to describe one or more uses the esthetic effects of which contribute visibly to the drawing's artistic quality.

In order to clarify this division into categories, Table 1 sets forth the dichotomy and defines each of the 10 characteristics from this point of view.

It is to be emphasized that all future reference to the 10 variables and interpretations concerning them are in terms of the dichotomy described above: *Indifferent* or *Remarkable.*

Procedure and Results

The 10 dichotomous variables described in Table 1 were correlated with one another over all available subjects using tetrachoric coefficients of correlation (9, chap. 13; 12, chap. 11). The necessary fourfold frequency tables were obtained on IBM equipment, and then the tetrachoric coefficients obtained from the nomographs of Cheshire, Saffir, and Thurstone (2). Each of the 10 dichotomous variables was also correlated with chronological age, in years, using biserial coefficients of correlation (9, chap. 13; 12, chap. 11). Tetrachoric and biserial coefficients were chosen because the dichotomies listed above are considered to represent underlying continuous variables, and also because this type of coefficient is not subject to the limitation, inherent in "point" or "phi" coefficients, of having their maximum value dependent on the marginal distributions of the dichotomies (12, p. 274).

The number of subjects varied according to the pair of characteristics being correlated, depending on the observability or nonobservability of the characteristic in question. The maximum number of subjects involved was 1011, and 36 of the 55 correlations made use of 900 or more of the subjects. The minimum number was 391, in the correlation between Gr and Mo, and all 19 of the correlations using less than 900 of the subjects involved one or the other of these two variables. Except for the one smallest N quoted, these N's ranged in the neighborhood of 600. It is not customary to prepare a correlation matrix for factor analysis in which the entries are based on varying numbers of subjects in this way, but the procedure was considered justified in this case because our interest here rests in the relations among these characteristics in the *abstract,* independent of the limitations imposed by their observability. The correlations are given above the main diagonal in Table 2.

As estimates of communalities, the squared multiple correlation coefficients of each of the 11 variables (including chronological age) on the other ten were obtained (3). These are shown on the main diagonal of Table 2. With these communality estimates on the diagonal, the matrix was factored,

TABLE 2

CORRELATION MATRIX AND RESIDUALS AFTER THREE FACTORS

Above main diagonal: Original correlation matrix (varying *Ns*—*see* text).
On main diagonal: Multiple R^2 communality estimates.
Below main diagonal: Residuals after three factors.

Variable	*R*	*Col*	*Gr*	*As*	*Sh*	*St*	*Mo*	*Med*	*Ar*	*L*	*Age*
R	(.74)	.50	.62	.65	.62	.62	.60	.80	.67	.72	.54
Col	.00	(.72)	.48	.52	.60	.68	.33	.70	.61	.45	.05
Gr	.01	−.12	(.78)	.68	.52	.55	.40	.74	.50	.60	.18
As	.03	−.01	.03	(.64)	.47	.44	.53	.69	.55	.47	.27
Sh	−.01	−.01	−.01	.00	(.93)	.87	.43	.66	.64	.58	.39
St	.01	.01	.03	.00	.03	(.96)	.20	.79	.70	.65	.42
Mo	−.01	.07	−.10	−.02	.12	−.01	(.79)	.50	.39	.50	.37
Med	−.01	.02	.02	−.01	−.12	−.02	−.06	(.97)	.87	.78	.49
Ar	−.01	.03	−.07	.01	−.08	−.07	−.03	.07	(.88)	.60	.47
L	.01	.00	.07	−.06	−.04	.02	−.03	.03	−.06	(.72)	.54
Age	.02	−.05	−.01	.03	−.03	.02	−.03	.02	.01	.01	(.60)
Maximum No. of Drawings Involved	1009	967	608	1011	1011	969	643	1011	979	995	1011
Per Cent in "Remarkable" Category	6.3	14.3	9.5	18.5	5.4	4.0	10.9	6.1	21.2	5.4	—

using a Principal Factor solution (4, chap. 7). (These operations were carried out on Purdue University's Datatron 205 computer.)

The problem of deciding how many factors to retain is more difficult than usual in this case because of the special features of this matrix—tetrachoric rather than product-moment coefficients, and varying *N*'s. Indeed, attempts to factor this matrix by two more rigorous methods had to be rejected on this account: an iterated Principal Factor solution, with continuously revised communality estimates, led to some "communalities" greater than one; application of Rao's Canonical Factor Analysis (10) appeared to call for the retention of six factors, a result which did not appear reasonable in the light of other solutions. In this latter application there was also an indeterminacy as to what value of *N* to use for the chi square test. In view of these difficulties it was decided to base the decision as to number of factors to be retained simply on an examination of the residuals. The residuals after the first three principal factors are shown below the main diagonal in Table 2. There are only four residuals having a numerical value of .10 or larger. As an additional indicator, the approximate standard error of each of the original tetrachoric coefficients was calculated (9, p. 372), and each of the residuals in Table 2 was divided by the corresponding standard error. Five of these "critical ratios" had numerical values of 1 or

larger, and only one had a numerical value greater than 2. This was taken to be satisfactory evidence that the first three principal factors are sufficient for adequately reproducing this correlation matrix. The loadings for the first three principal factors, before rotation, are shown in Table 3.

TABLE 3

FIRST THREE PRINCIPAL FACTORS (BEFORE ROTATION)

	Factors			Communalities	
Variable	*I*	*II*	*III*	*From Loadings*	*Mult. R^2 Estimates*
R	.84	.22	—.04	.76	.74
Col	.69	—.33	.29	.67	.72
Gr	.73	.05	.37	.68	.78
As	.71	.18	.33	.64	.64
Sh	.81	—.28	—.15	.76	.93
St	.84	—.46	—.20	.96	.96
Mo	.59	.55	.11	.66	.79
Med	.96	—.01	.05	.93	.97
Ar	.83	—.10	—.11	.72	.89
L	.79	.15	—.16	.67	.72
Age	.51	.29	—.53	.63	.60
Explained Variance	6.44	0.90	0.73	8.08	8.73

Because it is known that all of these characteristics of children's art show developmental changes with chronological age (6, 7, 8), it had been decided in advance to identify one of the factors with chronological age. It was for this reason that the Age variable was included in the analysis. In rotating the factors, therefore, factor I was rotated to coincide with the vector for the Age variable. The other two factors were then rotated, in the plane orthogonal to the Age factor, to obtain simple structure (11) in that plane. The rotated factor loadings are shown in Table 4.

In Table 4 it may be seen that factor I′ corresponds to the Age variable, which has zero loadings on the other two factors. Examining the loadings on Factor I′, we observe that, except for Col, Gr, and As, all other art variables have loadings of .5 or greater on this Age factor. Factors II′ and III′ may now be interpreted as representing nondevelopmental components, i.e., components independent of chronological age. Examining the loadings, we see that factor II′ may be identified primarily with Sh and St, which have loadings of .7 and .8, respectively, on factor II′, and near-zero loadings on factor III′, while factor III′ is to be identified primarily with Mo, which has a loading of .6 on factor III′ and a near-zero loading on factor II′. All the other art variables involve both of these factors, in varying degrees.

TABLE 4

ROTATED FACTORS

Variable	FACTORS *I'*	*II'*	*III'*	*Communalities*
R	.65	.35	.46	.76
Col.	.13	.74	.33	.67
Gr	.24	.50	.61	.68
As	.30	.37	.64	.64
Sh	.52	.69	.10	.76
St	.51	.84	—.03	.96
Mo	.51	—.03	.63	.66
Med	.59	.62	.45	.93
Ar	.57	.58	.23	.72
L	.67	.36	.31	.67
Age	.79	.00	.00	.63
Explained Variance	3.13	3.07	1.88	8.08

DISCUSSION OF RESULTS

Factor I' was chosen deliberately to represent the developmental (chronological age) factor. Following the principle of identifying a factor with one or more characteristics which contribute to it most heavily (i.e., have high factor loadings in Table 4) and keeping in mind that we may consider only that part of each characteristic not associated with other factors, factor II' may be labeled as a "Style" factor, quite closely related to the characteristics Sh and Col. Wherever St occurs as a remarkable characteristic which is suggestive of other than imitation of or resemblance to naturalism or realism, we may expect to find correspondingly a tendency to picture "intentionally indefinite" shapes. This is understandable since, for example, one of the characteristics of the "impressionistic" manner is that of having one area reach over into another and of painting or drawing in a manner that avoids clear outline or delineation of areas against each other. It also explains the relatively high loading of Col which, in nonrealistic tendencies of picturing, plays a role more significant than mere illustrativeness and which contributes strongly to style-effect such as impressionistic or expressionistic. Ar and Med also contribute to factor II'. The latter is closely tied to the use of color in the particular role of characterizing a given style and also in enhancing Sh. On the other hand, Motion seems entirely unrelated to the style factor.

Factor III' may be identified with Motion. Strongly contributing to this factor are planned asymmetrical composition and grouping. This combina-

tion of characteristics may be explained by the fact that successfully representing motion, if shown by a position picturing a phase or moment of an actual movement, tends to be directional, therefore unfavorable to a symmetrical or near-symmetrical composition; and that, in this sense, grouping would also tend to be asymmetrical, therefore contrary to "bandlike" groupings. However, grouping would have to be "well integrated" because only then could it contribute substantially to and sustain any intended and successfully carried out motion. If Mo is represented indirectly, that is, not by picturing of some stage of an actual movement, then the use of the medium can contribute in accentuating a direction (of motion), as indicated by the loading for Med on this factor. This may also lead to a deviation from symmetrical composition and would rely on a significant grouping-effect.

In conclusion, the factorial investigation of the 10 characteristics of children's art ability studied here tends to show (a) that a characterization through style is closely related to a characterization through shape and involves, rather directly, specific color uses (and, to a lesser degree, specific area treatments), and (b) that the interesting characteristic of expressing motion successfully seems closely related to the compositional character of the picture and its manner of grouping.

Summary

From data collected in one of several experiments carried out between 1936 and 1940 at the Cleveland Museum of Art for the purpose of investigating some aspects of children's art ability, 10 characteristics out of a large number of observed and itemized qualities in color drawings were selected: Representation, Color Use, Grouping, Intentional Asymmetry, Indefinite Shapes, Resemblance to Style, Motion, Use of Medium, Area Treatment, and Line Treatment. Each of these was divided into two categories: "Indifferent" and "Remarkable." These 10 dichotomous variables were then correlated with one another over all *Ss* (highest number 1011). This correlation matrix was factored, and three factors were retained for rotation to an interpretable solution. Factor I′ was chosen, deliberately, to represent Age (chronological). Of the two other factors, which may be interpreted as nondevelopmental components (i.e., independent of chronological age), one emerged as a Style factor, quite closely related also to Shape and Color Use; the other was identified as representation of Motion, strongly sustained by the characteristics of planned Asymmetry and Grouping. The remaining four characteristics contribute in varying degrees to both of these factors.

References

1. Burt, C. Tests of significance in factor analysis. *Brit. J. Psychol.*, 1952, 5, 109-133.

2. Cheshire, L., Saffir, M., & Thurstone, L. L. *Computing diagrams for the tetrachoric correlation coefficient.* Chicago: Univer. of Chicago Press, 1938.

3. Guttman, L. "Best possible" systematic estimates of communalities. *Psychometrika,* 1956, 21, 273-285.

4. Holzinger, K. J., & Harman, H. H. *Factor analysis.* Chicago: Univer. of Chicago Press, 1941.

5. Lark-Horovitz, Betty. Interlinkage of sensory memories in relation to training in drawing. *J. genet. Psychol.,* 1936, 49, 69-89.

6. Lark-Horovitz, Betty. Comparison of objective and subjective judgments of children's drawings. *J. exp. Educ.,* 1942, 10, 153-163.

7. Lark-Horovitz, Betty, & Norton, J. Children's art abilities: developmental trends of art characteristics. *Child Develpm.,* 1959, 30, 433-452.

8. Munro, T., Lark-Horovitz, Betty, & Barnhart, E. N. Children's art abilities: studies at the Cleveland Museum of Art. *J. exp. Educ.,* 1942, 11, 97-155.

9. Peters, C. C., & Van Voorhis, W. R. *Statistical procedures and their mathematical bases.* New York: McGraw-Hill, 1940.

10. Rao, C. R. Estimation and tests of significance in factor analysis. *Psychometrika,* 1955, 20, 93-111.

11. Thurstone, L. L. *Multiple factor analysis.* Chicago: Univer. of Chicago Press, 1947.

12. Walker, Helen M., & Lev, J. *Statistical inference.* New York: Holt, 1953.

RELATIONS BETWEEN BEHAVIOR MANIFESTATIONS IN THE HUMAN NEONATE[1]

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The behavior of the neonate is of importance to any theory which takes some stand on the nature-nurture problem. Watsonian behaviorism stimulated research on the neonate because the theory posited a limited innate repertoire developed into more complex behavior by conditioning. Psychoanalysts have become increasingly interested because of the tendency to attribute etiological significance to early aberrations in psychosexual development. Investigators representing various schools of thought have selected for special attention separate aspects of neonatal behavior such as sensory processes (7), sleep patterns and activity (11, 18, 29), oral activity (4, 13, 15), irritability and crying (26), and autonomic functioning (12, 24). In addition, a number of investigators have proposed explanations of personality deviations which could be subjected to more definitive study if it were possible to establish empirical anchors in characteristics detectable in neonates (17, 25, 27).

Information on how the many experimentally isolated aspects of neonate behavior are interrelated would provide a more adequate base for theories in this area. Identification of major patterns or systems should also facilitate

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the necessary studies of continuity over time. Without such studies it is not possible to link neonate characteristics to later personality development. The lack of consistency in characteristics traced by Bonham and Sargent (8) may be a result of the failure to keep sufficiently complex behavior systems under observation. Another major reason for interest in the ordering of these individual facets of behavior lies in the current need for a more complete theory of parent-child relations. Any comprehensive theory of how infant and parent characteristics interact must take into consideration as one component possible feedback effects of the infant on the parent. For this it is necessary to have some notion of the infant's behavior systems to which the parent is exposed. It is unlikely that the parent is reacting only to single, isolated behaviors. It seems more probable that the parent reacts not only to single facets of behavior but also to relationships between them or systems of response.

This study represented an initial survey of relations between some of the many variables showing individual differences between neonates. These are listed in Table 1, grouped into seven a priori categories. The a priori categories do not subsume all the possible behavior processes which have been studied in the neonate. For example, autonomic response, endocrine status, and neurological status are reflected only indirectly, if at all. Similarly, such potentially important factors as the physical appearance of the infant, considering its possible effect on the parent, are represented only grossly in the anthropometric indices. Separate surveys to relate factors identified in these areas to factors identified in the present study will be necessary because of the statistical and practical limitations on the number of dimensions which can be incorporated in a single study. Nonetheless, the categories selected for this study are intended to sample all the areas of overt behavior which have been given concerted attention as indicated in the foregoing review of the literature.

Method

Thirty-two white, male first-born infants were selected for study providing there was no record of complications of pregnancy or delivery. Mothers were wives of noncommissioned Navy and Marine Corps personnel who were selected for a larger study providing they showed attitude patterns on a questionnaire resembling those shown by any one of five parental subgroups being studied (6). The infants were thus subject to two selective procedures, one direct and the other indirect, in terms of the attitude patterns shown by their mothers. Sound and color motion picture records were made in the hospital nursery of all infants at approximately the 96th postnatal hour, five to eight second film sequences being made of spontaneous behavior every 15 minutes over a three-hour experimental period following a feeding and preceding the next feeding. In addition, when the

infant reached the lowest state of excitation, as evidenced by closed eyes, infrequent bodily movement, and regularity of breathing, five to eight second sequences of behavior before and after experimentally introduced interventions were filmed as described in Table 1. The interventions were repeated two to three times as conditions permitted.

TABLE 1

INFANT CHARACTERISTICS AND METHODS OF MEASUREMENT*

Cutaneous Sensitivity

Except where noted, the measure used is the average of ratings by two judges on a seven-point scale from behavior filmed while infant was asleep. High ratings indicate extensive and immediate movement following stimulation cited. Sleep was judged by the fact that the eyelids were shut, movements were at a low level, and breathing regular.

1. *Reaction to Blanket Removal*—to permit optimal filming blanket was removed approximately 11 times during the three-hour experimental period whether infant was asleep or awake. The removal produced mild cutaneous stimulation.
2. *Facial Reaction to Cheek Stroke*—mouth or other facial movements in response to light stroke on cheek by experimenter's index finger, repeated two or three times. Rooting reflex was an infrequent mode of response since infant was asleep and this reflex is seldom elicited during sleep.
3. *Reaction to Cheek Stroke*—movements other than facial in response to light stroke of cheek by experimenter's index finger, repeated two or three times.
4. *Reaction to Arm and Thigh Stroke*—light hand stroke on the lateral surface of the limb.
5. *Reaction to Back and Stomach Stroke*—light hand stroke repeated two or three times.
6. *Reaction to Body Grasp*—firm grasp around chest or back, depending on body's position, repeated two or three times.
7. *Reaction to General Handling*—reaction to holding, change of position, or being dressed, whether infant was asleep or awake.
8. *Reaction to Wet Diaper*—reaction during any film sequence in which diaper was wet, whether infant was asleep or awake.
9. *Reaction to Miscellaneous Contact*—reaction to any other contacts while awake or asleep.

Auditory Sensitivity

Except where noted, all variables are rated as in Cutaneous Sensitivity.

10. *Reaction to High, Sharp Click*—three sounds in rapid succession produced by a small metallic "frog" snapper of type frequently used in developmental tests. It had a snapping blade 12 mm. by 35 mm. and was held 15 cm. lateral to the ear.
11. *Reaction to Low, Sharp Click*—three sounds in rapid succession produced by standard, spring loaded, house lightswitch held 15 cm. lateral to the ear.
12. *Reaction to Loud, Low Noise*—a noise of 84-88 decibels, as measured by a General Radio 1551A sound level meter, was produced by a blow on a metallic resonating chamber below the infant's crib. This sound was selected after trial as capable of producing a full Moro reflex in 50 per cent of infants tested.
13. *Reaction to Noise of Camera*—experimenter's rating on a seven-point scale based on direct observation of infant's reaction to motor noise of Auricon CM-71 camera operated for 5 to 8 sec. 2½ ft. from infant's ear. The noise was repeated approximately 17 times during the experimental period.

(*table continued on next page*)

TABLE 1 (*continued*)

INFANT CHARACTERISTICS AND METHODS OF MEASUREMENT*

Visual Sensitivity

Except where noted, all variables rated as in Cutaneous Sensitivity.

14. *Reaction to Penlight*—closed eyelid exposed to light for 1 sec., three times in immediate succession. The series was repeated two or three times during sleep.
15. *Amount of Looking*—rating based on both openness of the eyes and movement of head and eyeballs while eyes open.
16. *Reaction to Flood Light*—experimenter's rating on a seven-point scale based on direct observation of infant's reaction to change from ordinary room illumination produced by a 60-w. bulb to that produced by a 2500-w. flood lamp, the change occurring approximately 17 times during the experimental period. The flood lamp was directed at the ceiling 6 ft. over the infant's head and turned on for 5 to 8 sec. in order to permit filming of behavior.

Sleep and Activity

Except where noted, the measure used was an average of ratings by two judges on a seven-point scale from filmed behavior during intervals when there was agreement between judges that infant was asleep.

17. *Sleep - Facial Movements*—a high rating was accorded extensive and frequent movements of eye balls, wrinkling of the forehead, grimaces, and other facial movements.
18. *Sleep - Limb and Body Movements*—a high rating was accorded extensive and frequent movements of head, arms, legs, and trunk.
19. *Ease of Awakening*—a high rating was accorded a rapid increase in wakefulness following a variety of stimulations during the experimental period while asleep. These stimulations included those incident to routine nursery care, and internal processes such as bowel movements and urination.
20. *Rate of Return to Sleep*—a high rating was given to a slow rate of return to sleep after being awakened by conditions enumerated in 19, above.
21. *Amount of Time Spent Sleeping*—number of filmed intervals in which infant was judged asleep expressed as a percentage of the total number of filmed intervals.
22. *Movements While Awake*—actual count of the number of head, arm, trunk, and leg movements observed in filmed intervals when infant was judged to be awake, not crying, and not subject to any stimulations listed in 19 above.

Strength, Muscle Tone, and Body Position

In all cases the measure used was an average of ratings by two judges on a seven-point scale from filmed behavior while infant was awake, in the case of variables 23 and 24, and while either awake or asleep in the case of variables 25 and 26.

23. *Strength Shown on Stomach*—high ratings were given movements of head upward and sideways, lifting of chest, turning of trunk, and movement of the body by extension of legs against surface after being picked up and placed on the stomach.
24. *Reaction to Being Held Up*—high ratings were given for greater tonicity in musculature of the neck.
25. *Leg Retraction While on Stomach*—high rating for typical posture involving flexion of the knees.
26. *Leg Retraction While on Back*—Same as for 25.

(*table continued on next page*)

TABLE 1 (*continued*)

INFANT CHARACTERISTICS AND METHODS OF MEASUREMENT*

Oral Behavior

27. *Hand-Mouth Movements*—average of counts by two judges of hand movements resulting in a contact with the lips at any time during filmed experimental period.
28. *Eagerness of Hand-Mouth Contacts*—average of ratings by two judges on a seven-point scale from hand-mouth contacts shown in filmed behavior at any time in the experimental period. This rating included aspects not measured in 27, above, such as persistence.
29. *Empty Sucking or Mouth Movements*—average of ratings by two judges on a seven-point scale of frequency and extent of tongue, mouth, and jaw movements shown in filmed behavior at any time in the experimental period.
30. *Sucking Rate*—number of sucks divided by number of motion picture frames (24 frames per second) as recorded by a single observer who viewed, frame by frame, films made of infant sucking on a special apparatus. The apparatus was similar to that developed by Balint (4) in which a rubber nipple is connected by an air line to an apparatus which records vacuum in the oral cavity. In this case the air line was connected to a vacuum gauge calibrated to measure from zero to 45 mm. of mercury. The sucks appeared as deflections from zero on the vacuum gauge. The number of sucks was divided by the number of frames of film so as to equate infants for differences in amount of sucking filmed. On the average, filmed material consisted of 5-sec. films taken at 15-sec. intervals during the first one to two minutes of sucking on the air gauge. Infants were started on the sucking apparatus one-half hour before a scheduled feeding time, approximately three hours following completion of the last feeding.
31. *Sucking Amplitude*—average vacuum in mm. of mercury for sucks measured as in 30, above.
32. *Sucking Variability*—standard deviation of vacuum in mm. of mercury for sucks measured as in 30, above.
33. *Intensity in Onset of Sucking*—excitability in starting sucking on apparatus indicated in 30, above. Average of ratings by two judges based on films of initial ten seconds of sucking.

Crying

All measures obtained from sound motion-picture record available for the experimental period.

34. *Amount of Crying*—time in seconds in which infant was crying as recorded by a single observer.
35. *Loudness of Crying*—loudness ratings averaged for two judges.
36. *Pitch of Crying*—pitch ratings on seven-point scale, averaged for two judges.
37. *Pulse-Frequency of Crying*—average for two judges of frequency of crying pulses, defined as periodic changes in both loudness and pitch.

Anthropometric

38. *Birth Weight*—weight in kilos.
39. *Birth Length*—length in cm.
40. *Anthropometric Index*—weight / (length)^2. The rationale for this index has been described by Bayley and Davis (5).

* In order to conserve space in the table some items described only the nature of the stimulus, others the behavior rated. Reference to the general description of the measurement of variables under each category heading is necessary to obtain a complete understanding of all the operations involved.

Two variables were included in the matrix of correlations but not in the factor analysis because of computer program limitations. These variables were Reaction Time Following Removal of Nipple and Resistance to Starting Feeding. Variables should be located on the correlation matrix by title rather than number because of the renumbering necessitated by this omission.

Spontaneous or experimentally induced behavior was rated on a seven-point scale or, if countable, was counted by two judges. If behavior was readily measured, only one judge carried out the measurements. On the basis of a calibration series measures not showing interjudge reliability of .60 or more, when corrected by the Spearman-Brown formula, were eliminated. Reliabilities for the variables retained are shown in Table 2. A centroid factor analysis was performed on the product-moment intercorrelations using the University of Michigan Complete Centroid Program and five factors were rotated using a Varimax computer program (16).[2]

Results and Discussion

Interjudge reliability cannot be considered an index of the stability of a variable, particularly in the case of the neonate whose growth processes are so rapid that it is difficult to establish consistency over time. However, for the purpose at hand of studying the relations between variables measured at the same cross-section of time the reliabilities appear to be adequate. The stability of the factors and variables over time must be the subject of another study, one which should be facilitated considerably by the establishment of patterns of relations between variables. Five orthogonal factors which emerged following rotation are shown in Table 2, variables being grouped under the suggested factor designation with which they showed the highest rotated factor loading.

It is evident from Table 2 that the factors are well defined and interpretable. The nature of the loadings on factors I and II, however, suggested the need for further clarification of the distribution of variables between the two factors. All variables listed as showing loadings on either factor I or II were plotted graphically against these two reference axes, as shown in Figure 1. This revealed that the variables involved are distributed primarily throughout one quadrant between the two axes rather than being located along either axis or in separate clusters. The distribution of variables in the quadrant extends from Empty Sucking or Mouth Movements and Sleep-Limb and Body Movements through to Pulse Frequency of Crying and Movements While Awake. Variables loading on factor I on one side of the quadrant seem largely to reflect states of disturbance in the infant. The two highest loadings are on pulse-frequency and amount of crying. Amount of Time Spent Sleeping is loaded negatively on this factor. Factor II on the other side of the quadrant has its two highest loadings on variables

[2] The correlation matrix, centroid factor matrix, and the transformation matrix have been deposited as Document number 6298 with the ADI Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. A copy may be secured by citing the Document number and by remitting $1.25 for photoprints, or $1.25 for 35 mm. microfilm. Advance payment is required. Make checks or money orders payable to: Chief, Photoduplication Service, Library of Congress.

TABLE 2

ROTATED FACTOR MATRIX OF INFANT MEASURES

Factors with Measures Defining Each Factor	*Reliability**	*I*	*II*	*III*	*IV*	*V*
I. *Arousal*						
37 Pulse-Frequency of Crying	78	68	−16	19	05	−09
34 Amount of Crying	†	67	−16	−03	05	−01
20 Rate of Return to Sleep	84	61	−46	08	−05	−09
35 Loudness of Crying	89	60	−10	−02	−13	04
22 Movements While Awake	100	59	04	04	13	−14
2 Facial Reaction to Cheek Stroke	89	53	−59	15	20	−01
28 Eagerness of Hand-Mouth Contacts	92	52	−64	−22	07	−19
19 Ease of Awakening	90	50	−62	00	−15	−07
7 Reaction to General Handling	69	50	−24	57	−17	23
8 Reaction to Wet Diaper	88	48	−18	45	−06	15
27 Hand-Mouth Movements	98	46	−50	−09	−09	−28
23 Strength Shown on Stomach	93	43	04	−58	19	−02
24 Reaction to Being Held Up	91	37	−25	−23	11	26
21 Amount of Time Spent Sleeping	†	−68	09	−02	02	34
II. *Depth of Sleep*						
17 Sleep - Facial Movements	85	27	−81	07	−06	−04
18 Sleep - Limb-Body Movements	84	20	−81	11	−04	02
28 Eagerness of Hand-Mouth Contacts	92	52	−64	−22	07	−19
19 Ease of Awakening	90	50	−62	00	−15	−07
2 Facial Reaction to Cheek Stroke	89	53	−59	15	20	−01
10 Reaction to High, Sharp Click	85	09	−53	01	24	−06
29 Empty Sucking or Mouth Movements	85	01	−53	15	05	03
13 Reaction to Noise of Camera	‡	09	−52	−03	14	−09
27 Hand-Mouth Movements	98	46	−50	−09	−09	−28
6 Reaction to Body Grasp	85	−17	−46	43	−35	−07
11 Reaction to Low, Sharp Click	78	18	−46	06	25	13
16 Reaction to Flood Light	‡	−30	−46	23	−20	13
20 Speed of Return to Sleep	84	61	−46	08	−05	−09
14 Reaction to Penlight	83	06	−38	01	−21	−15
III. *Tactile Sensitivity - Strength*						
9 Reaction to Miscellaneous Contact	79	24	−21	82	−26	13
1 Reaction to Blanket Removal	76	01	−17	71	16	14
3 Reaction to Cheek Stroke	75	09	−18	70	22	−14
4 Reaction to Arm and Thigh Stroke	71	−16	−14	63	−24	−22
5 Reaction to Back and Stomach Stroke	83	00	−10	61	−27	−13
12 Reaction to Loud, Low Noise	84	−13	07	59	04	05
7 Reaction to General Handling	69	50	−24	57	−17	23
8 Reaction to Wet Diaper	88	48	−18	45	−06	15
40 Anthropometric Index: weight/(length)^2	†	12	05	45	15	15

(*table continued on next page*)

TABLE 2 (*continued*)

ROTATED FACTOR MATRIX OF INFANT MEASURES

Factors with Measures Defining Each Factor	*Reliability**	*I*	*II*	*III*	*IV*	*V*
III. *Tactile Sensitivity - Strength* (continued)						
6 Reaction to Body Grasp	85	−17	−46	43	−35	−07
36 Pitch of Crying	78	−17	−24	−38	−05	−04
23 Strength Shown on Stomach	93	43	04	−58	19	−02
IV. *Oral Integration*						
30 Sucking Rate	†	−03	−13	−09	82	−10
33 Intensity in Onset of Sucking	93	10	−10	03	63	−23
31 Sucking Amplitude	‡	06	−10	−01	37	13
6 Reaction to Body Grasp	85	−17	−46	43	−35	−07
15 Amount of Looking	94	30	−04	−04	−42	−31
32 Sucking Variability	†	09	−32	02	−46	19
V. *Fetal Position*						
39 Birth Length	†	−18	−04	−10	−17	75
38 Birth Weight	†	−06	02	29	02	71
26 Leg Retraction While on Back	60	−13	10	−03	09	67
25 Leg Retraction While on Stomach	92	06	28	08	−18	39

* Pearson product-moment correlation (Spearman-Brown formula applied to correlation between values assigned by two judges).

† Actual physical measurements made directly or from recorded film record.

‡ Reliability estimate not available since behavior sequence could not be completely filmed and observations were made by a single observer.

involving bodily movements during sleep, which Aserinsky and Kleitman (3) have shown to be asociated with other indices of depth of sleep.

Factor I, Arousal, appears to reflect transient disturbances in the infant in view of the positive loadings of Reaction to General Handling, Reaction to Wet Diaper, and three measures of crying and the negative loading of Amount of Time Spent Sleeping. It has been shown that amount of crying is related to the amount of caretaking activities (1). Factor II, Depth of Sleep, on the other hand, has some likelihood of reflecting more stable characteristics of the infant in view of the fact that no appreciable loadings were shown for measures of crying. In addition, Aserinsky and Kleitman (3) have demonstrated that the duration of phases of deep and shallow sleep are remarkably similar in infants and adults. Both of these considerations favor studies of the continuity of this factor over time.

Several variables are located near the midpoint of the quadrant. These variables may be jointly determined by the infant's basic characteristics relative to depth of sleep and by more temporary states. The variables are

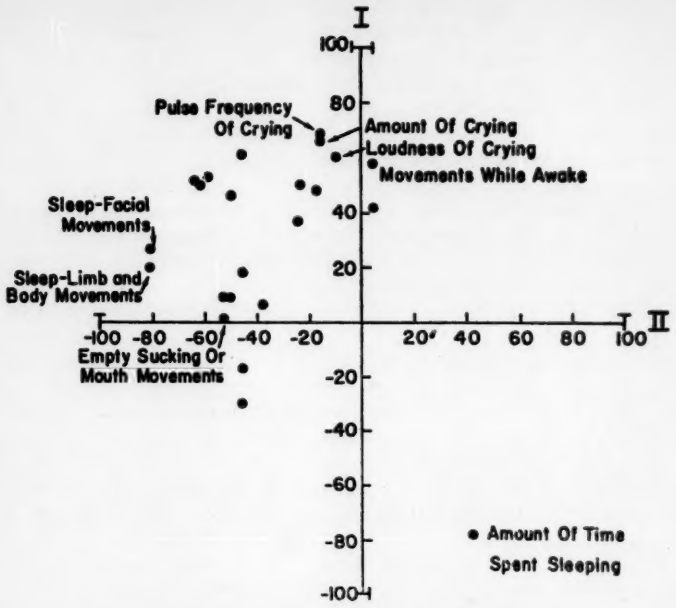

FIGURE 1—Loading of infant measures on factors I and II.

Rate of Return to Sleep, Ease of Awakening, Facial Reaction to Cheek Stroke, Eagerness of Hand-Mouth Contacts, and Hand-Mouth Movements. One other possiblity is that the continuum of which these measures are a part is merely a reflection of level of arousal. Duffy (10) has summarized research from a large number of studies, conducted in the main with adults, which are interpretable as demonstrating the existence of such a continuum for each individual. That is, each individual is considered as having a characteristic level of arousal as shown in both physiological and overt behavior measures. He is presumed to depart from this level in one direction when sleeping and in another when in states of agitation and anxiety. The existence of such a continuum cannot be checked on data from the present study which are cross-sectional in nature. Future research on the neonate could well consider this possibility.

The loadings on factor I of Movements Before Stimulation, Amount of Time Spent Sleeping, and three variables involving crying are consistent with the findings of Brownfield (9) that a group of neonates high in over-

all activity cried more and spent less time sleeping. The interpretation of the meaning of activity measures must be reconsidered, however. Although Movements While Awake showed a loading only on factor I, facial and limb-body movements during sleep showed loadings primarily on factor II. This would suggest that activity under the two circumstances should be considered separately. Activity during waking states should probably not be considered an index of some stable characteristic of an infant unless evidences of temporary disturbances can be ruled out. Activity measured during the sleep cycle may be less sensitive to such disturbances.

The fact that 22 variables can be located in a quadrant between factors I and II suggests that many more aspects of neonatal behavior than are customarily considered are actually manifestations of the infant's sleep cycle and temporary level of excitation. Since many of the variables showing loadings on both factors are not obvious measures of these factors, it would appear advisable to evaluate any new behavior characteristics detected in the neonate against measures of these factors regardless of whether they would appear relevant on an a priori basis.

The Tactile Sensitivity - Strength factor, factor III, shows positive loadings on almost all measures involving reaction to skin contact, a positive loading on what may be described as a "chubbiness index," and negative loadings on Strength Shown on Stomach and Pitch of Crying. The negative relationship between measures of tactile sensitivity and the measure of muscular strength is an unusual finding not reported previously in the literature. Factor III appears to deserve special consideration on another ground, also. Since tactile sensitivity can be demonstrated in the fetus in the first two months, it can be assumed that the tactile components of this factor are less subject to rapid change in the metamorphic processes which so characterize other sensory processes in the neonate, such as vision and audition. This should facilitate studies of continuity.

Since movements by an organism in space increase the probability of injury to skin surfaces, it seems possible to interpret high scores on this factor as reflecting a congenital endowment favoring restriction on motility and a greater need for protection from injury. Low scores may reflect relative insensitivity to injury and a corresponding skeletal masculature capable of high motility in space. Further speculations concerning implications for the mother-infant relationship are obscured because it is not possible to interpret measured reactions to skin contact as indicators of tension reduction, need gratification, or frustration. It can only be said that a given infant reacted more or less than other infants. Research on the differential quieting effect of skin contact for different infants is one possible means of studying this factor further.

The possibility should also be investigated that factor III may represent a genetically controlled, sex-linked variable. Since this could not be checked on the all-male sample used in this study, the authors reviewed other studies in which either skin sensitivity or muscle strength had been studied on

male and female samples. The hypothesis was that females should show higher tactile sensitivity and lower skeletal muscle strength, and males the opposite. Data relating both variables could not be found in any single study, but a reanalysis of Shirley's data (26) for infants in the first year of life showed that females had significantly higher ratings on irritability in connection with handling during the anthropometric examinations, the significance level being .05 for a one-tailed test. On adults it has been indicated that females show lower pain thresholds and finer two-point discrimination (2, pp. 415-416). Lipsitt and Levy (20) have reported lower thresholds for female neonates on tests for pain threshold with a Grass Stimulator. Terman and Tyler (28) have reported that males show higher muscular strength at all ages for which tests have been reported in children. The only study which could be located which has reported objective measurements of muscle strength in the newborn was one by Knop (19) who used a very gross four-point scale for rating strength and reported males showing higher muscle strength. When the raw data reported in the paper were subjected to a statistical test, the difference was found to be significant only at the .14 level. The data on sex-linkage for this factor are therefore only suggestive.

The Oral Integration factor shows positive loadings on measures of sucking activity which would ordinarily be associated with efficiency in feeding. That is, vigorous onset of feeding, rapid sucking, and high vacuum should be associated with effective feeding. Negative loadings are shown on variables which reflect lack of steadiness in sucking and lack of exclusive orientation to the feeding situation as compared to other sources of stimulation. Reaction to Body Grasp is not useful in defining this factor uniquely because of its loadings on other factors. The negative loading of Amount of Looking suggests the possibility for further research that low scores on this factor may be associated with some irregularity of development or possible brain damage. Parmelee (22) has asserted on the basis of clinical observations that some brain-damaged neonates show more "staring" than normal infants. "Looking" in the present study consisted of ratings of the extent to which eyes were open and head and eyeballs moving in apparent scanning. Also related is the report of Moore and Ucko (21) that neonatal asphyxia is associated with irregularities in feeding manifest in the first year. William Windle, in a personal comunication, has also indicated that inability to suck or other evidences of difficulty in feeding are prominent in rhesus infants subjected to experimental neonatal asphyxia. The criteria for selection of infants for the present study operate against any substantial contribution of neonatal asphyxia to the results, but, in the absence of detailed study of the delivery of each infant, this factor cannot be ruled out entirely.

The Fetal Position factor shows loadings on both measures of weight and length as opposed to the loading on the ratio of weight to length shown on the previous factor. The loadings of measures of leg retraction on this

factor were somewhat surprising. The latter measures were included to provide some clarification of the frequent observation of differences between infants in the extent to which they show a "fetal posture," defined as knees drawn up against the abdomen. The position of the arms seems less clearly associated with defining a fetal position on an observational basis and leg retraction was settled upon as a measure. One interpretation of this factor is that infants who are longer and heavier must be folded up more *in utero*. They would possibly still be manifesting effects of this at four days. Since weight also loads on this factor, it is not readily interpreted as a post-maturity syndrome, which is ordinarily associated with greater length but not greater weight.

To the extent that Freud's notion of a sensory barrier in infants, as described by Bergman and Escalona (7), implies a single barrier, the over-all results of this set of data are not confirming; that is, no single sensory barrier factor emerged. The records of individual infants also do not reveal any who could be described as generally sensitive. Sensitivity is manifest in one or two modalities at most. Reactions to auditory and visual stimulation are present at this age but do not show sufficient intramodality consistency to emerge as identifiable factors or even to load on a factor which is exclusively sensory in nature. This is probably a consequence of the late maturation of these functions for which evidence has been summarized by Pratt (23). If the concept of a sensory barrier is recast in terms of specific barriers in different modalities, factor III may represent the manifestation of differences in infants relative to one class of stimulation. Muscle strength and other measures also load on this factor, however, which indicates that more is involved than the notion of a sensory barrier can encompass.

That nearly all the measures of cutaneous sensitivity emerged as belonging to a single factor suggests a temporal order in maturation of processes which involve skin contact. Reactions to tactile stimulation can be observed as early as the second fetal month. The prominence and organization of responses to different forms of skin contact in the present study on four-day-old infants is consonant with the findings on dominance of needs for skin contact in the rhesus neonate reported by Harlow (14). It is worthwhile to consider the possibility that in both primates the development of a sensory function necessary to establishing and maintaining contact with a nurturing caretaker might well show precedence in maturation over other processes.

The over-all factorial structure also has implications for the place of orality in psychoanalytic theory. It should be pointed out that oral behavior was sufficiently well developed and integrated to emerge in the form of a factor. It is also apparent, however, that measures of Hand-Mouth Movements and Eagerness of Hand-Mouth Contacts did not load on the same factor but on another which seems related in some way to the level of arousal shown by the infant. Oral processes should apparently not be considered as exclusively representing the functioning of some single system.

Even in the four-day-old infants of this study the organization of both sensory and oral processes is quite complicated.

From the standpoint of general developmental theory it is noteworthy that a number of well organized behavioral systems exist in the neonate. Responses are sufficiently related within a class that we can infer the existence of a system. But, except as noted in connection with factors I and II, the systems themselves are as yet unrelated. The manner in which these become integrated and differentiated over time is an intriguing challenge for research.

Summary

Thirty-seven measures of behavior were obtained from film records made approximately 96 hours following delivery for each of 32 male infants selected as showing no evidence of perinatal complications. Anthropometric indices were added to these measures; intercorrelations were computed and subjected to a factor analysis. Five orthogonal factors which emerged were identified as Arousal, Depth of Sleep, Tactile Sensitivity-Strength, Oral Integration, and Fetal Position. Twenty-two measures of manifestly quite different behavior manifestations could be located in a quadrant between the two axes represented by Arousal and Depth of Sleep. It was suggested that many behaviors of the infant at this age are merely manifestations of level of arousal. The latter is assumed to be a joint function of temporary states of disturbance in the infant and more stable processes involving depth of sleep. Activity while asleep and awake appeared to represent two different processes rather than a single unitary process. Differences between infants on the Tactile-Strength factor may be of importance for later development because there is evidence that underlying components are sufficiently matured to show some continuity over time. Evidence for a possible sex linkage in this factor is summarized. Factorial structure was not consistent with the concept of a single sensory barrier or with the notion that all oral processes in the infant represent some single unitary entity.

References

1. Aldrich, C. A., Sung, C., & Knop, Catherine Q. The crying of newly born infants: I. The community phase. *Proc. Mayo Clinic*, 1945, 20, 347-352.

2. Anastasi, Anne. *Differential psychology: individual and group differences in behavior*. New York: Macmillan, 1937.

3. Aserinsky, A. E., & Kleitman, N. A motility cycle in sleeping infants as manifested by ocular and gross bodily activity. *J. appl. Physiol.*, 1955, 8, 11-18.

4. Balint, M. Individual differences of behavior in early infancy, and an objective method for recording them. *J. genet. Psychol.*, 1948, 73, 81-117.

5. Bayley, Nancy, & Davis, F. C. Growth changes in bodily size and proportions during the first three years: a developmental study of 61 children by repeated measurements. *Biometrika*, 1935, 27 (Parts I and II), 26-87.

6. Bell, R. Q. Maternal types identifiable through attitude measures. *Amer. Psychologist*, 1957, 12, 398. (Abstract)

7. Bergman, P., & Escalona, Sibylle K. Unusual sensitivity in very young children. *Psychoanal. Stud. Child*, 1949, 3-4, 333-352.

8. Bonham, Martha A., & Sargent, Mae K. A study of the development of personality traits of children 24-30 months of age. Unpublished master's essay, Catholic Univer., 1928.

9. Brownfield, Edith D. An investigation of the activity and sensory responses of healthy newborn infants. *Dissert. Abstr.*, 1956, 16, 1288-1289.

10. Duffy, Elizabeth. The psychological significance of the concept of "arousal" or "activation." *Psychol. Rev.*, 1957, 64, 265-275.

11. Fries, Margaret E. Mental hygiene in pregnancy, delivery, and the puerperium. *Ment. Hyg.*, 1941, 25, 221-236.

12. Grossman, H. J., & Greenberg, N. H. Psychosomatic differentiation in infancy. *Psychosom. Med.*, 1957, 19, 293-306.

13. Halverson, H. M. Infant sucking and tensional behavior. *J. genet. Psychol.*, 1938, 53, 365-430.

14. Harlow, H. F. The nature of love. *Amer. Psychologist*, 1958, 13, 673-685.

15. Jensen, K. Differential reactions to taste and temperature stimuli in newborn infants. *Genet. Psychol. Monogr.*, 1932, 12, 363-479.

16. Kaiser, H. F. The varimax criterion for analytic rotation in factor analysis. *Psychometrika*, 1958, 23, 187-200.

17. Kallman, F. J., & Baroff, G. S. Abnormalities of behavior (in the light of psychogenetic studies). *Annu. Rev. Psychol.*, 1955, 6, 297-326.

18. Kleitman, N., & Engelman, T. G. Sleep characteristics of infants. *J. appl. Physiol.*, 1953, 6, 269-282.

19. Knop, Catherine. The dynamics of newly born babies. *J. Pediat.*, 1946, 29, 721-728.

20. Lipsitt, L. P., & Levy, N. Electrotactual threshold in the human neonate. *Child Develpm.*, 1959, 30, 547-554.

21. Moore, T., & Ucko, L. E. Night waking in early infancy. Part I. *Arch. Dis. Childh.*, 1957, 32, 333-342.

22. Parmelee, A. H. *Management of the newborn.* Chicago: Yearbook, 1952.

23. Pratt, K. C. The neonate. In L. Carmichael (Ed.), *Manual of child psychology.* (2nd Ed.) New York: Wiley, 1954. Pp. 215-291.

24. Richmond, J. B., & Lustman, S. L. Autonomic function in the neonate. *Psychosom. Med.*, 1955, 17, 269-273.

25. Sheldon, W. H. *The varieties of human physique.* New York: Harper, 1940.

26. Shirley, Mary M. *The first two years, a study of twenty-five babies: Vol. III. Personality manifestations.* Minneapolis: Univer. of Minnesota Press, 1933.

27. Slater, E. T. O. *Psychotic and neurotic illness in twins.* London: H. M. Stationery Office, 1953.

28. Terman, L. M., & Tyler, Leona E. Psychological sex differences. In L. Carmichael (Ed.), *Manual of child psychology* (2nd Ed.). New York: Wiley, 1954. Pp. 1064-1114.

29. Weiss, L. A. Differential variations in the amount of activity of newborn infants under continuous light and sound stimulation. *Univer. Iowa Stud. Child Welf.*, 1934, 1-74.

AN EXPERIMENTAL APPROACH TO THE ANALYSIS OF ADOLESCENT NEEDS

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Need as a psychological construct has gained increasing currency during the last three decades, until at present, psychological needs have a major place in almost all texts of psychology. Almost every discussion of the child or adolescent includes needs or need-like concepts as important descriptive and explanatory variables. Need is defined in the present study as an abstraction from a classification of the observed directional aspects of behavior. Murray's (2, 3) definition of need as a construct or hypothetical force within the individual which can be inferred from observations of the directional or qualitative and quantitative aspects of behavior is similar to and entirely consistent with the above definition. The operation of inferring needs is essentially one of studying many discrete goal-directed acts of a given individual or group, observed either directly or indirectly (through tests), and of grouping such acts into classes according to the psychological goals to which they point. By changing the focus of the study from the goals outside the individual to the condition within the individual, one can infer needs which can then be grouped into more general classes. Thus, a need is dependent upon behavioral events for its identification and distinguishability from other needs.

Group rather than individual methods of studying the needs of adolescents have predominated, the two most popular being the problem inventory or check list and the questionnaire. Typical results have been lists of goals or sources of worry most frequently checked without further classification into broader need categories. Analysis of replies to more or less

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general questions about wishes, needs, or problems has been another common approach to the study of adolescent motivation. Studies using this method have generally not gone so far as to infer broad need categories from the specific goals and problems indicated by the youth studied. Direct observations of behavior or the case history approach were used by the few remaining studies which have provided some meaningful need categories that are neither too narrowly concrete nor too broadly abstract. On the whole, previous studies of adolescent problems and needs have resulted in many lists of differing length and degree of duplication, making up an extensive array of items which range from needs as concrete goal objects, on the one extreme, to highly abstract needs on the other. The number of need variables reported in the literature already appears to be greater than would be necessary to explain adolescent behavior, and further increase in their number is not likely to reduce ambiguity. The problem at hand, therefore, seemed to be primarily one of ordering that which is already known.

Purpose

One of the purposes of the present study was to identify the psychological needs of a given adolescent population. The factorial validation of items preliminary to the eventual development and validation of a group test of needs for adolescents became a second purpose of the study when the investigators decided to take full advantage of previous studies by condensing the needs and need-related goals cited in the literature into an experimental form suitable for group administration. A multineed group measure with items representing common areas of behavior and with a scoring system that gives need scores directly would have wide application. The proposed method would make it possible to study adolescents individually or as a group and might serve to answer imporant questions such as: Do the needs of a group of adolescents conflict with established social patterns in the community? To what extent are the needs of adolescents being met? What needs could be met more fully? How do the needs of adolescents in one community, section, or region compare with those of adolescents elsewhere? What is the normative developmental pattern of motivation through the age levels within the adolescent period?

Method

All of the different needs of adolescents, cited in the literature of psychology and education, were listed and a total of 70 more or less exclusive needs resulted (1). Some appeared to be related to others, but no two were included that were closely similar. Murray's list of needs (3) was also included, although his research had not been concerned with adolescents as such. A complete bibliography of source material for the list of needs appears elsewhere (1). The 70 needs were then sorted by six judges into 12

groups; each group was judged unrelated to all others, and all items within groups were judged related to each other. Each of the 12 need groups was named and defined by referring to the component items and to the definitions given them by their originators. The 12 need categories were: Acceptance, Achievement, Affection, Approval, Belonging, Conformity, Dependence, Independence, Dominance, Recognition, Self-realization, and To be understood.

Since a reasonably explanatory and predictive need would likely influence behavior in a variety of social situations, the items of the experimental needs test were written so that each of 12 needs was represented in each of seven social settings: (a) like-sexed peer group, (b) heterosexual peer group, (c) like-sexed pair, (d) heterosexual pair, (e) the family, (f) the school, and (g) adults in general. Six additional items for six of the need categories were written for a nonsocial setting, the self.

The item design was suggested by the fourth section of A Test of Personality Adjustment (4). Simple declaratory statements were written about hypothetical boys and girls behaving in the above social settings. Common names, different for each item, were used, boys' names for one form of the test and girls' names for the other. Following each statement were the questions:

Am I like (John)?	Yes	No
Do I want to be like him?	Yes	No

Subjects were required to react to each statement by checking either "Yes" or "No" for each question. Unlike Rogers' items, however, no responses between "Yes," on the one extreme, and "No," on the other, were possible; subjects were forced to mark one or the other of the two alternatives for each question. Compared to the check list approach, the present item design requires a complex response; first, a comparison of self with a described person, and second, a decision as to whether the circumstance of the described person is desired or not. Responses to the first question were considered to reflect the subject's perceptions of self; responses to the second, to indicate his perceived goals. Responses of "No" for the first question and "Yes" for the second (when the statement described a valued circumstance), or "Yes" for the first question and "No" for the second (when the statement described an unwanted circumstance), were regarded as indicative of goal oriented behavior from which needs might be inferred. Thus, need was operationally defined as those responses of subjects that reflect discrepancies between perceptions of self and perceived goals for self.

A preliminary form of the experimental needs test was administered to 200 male and female adolescents living in an orphans' home. As a result of the trial administration and subsequent item analysis, some of the items were replaced and others revised. The final 90-item experimental needs test was then administered to 725 in-school adolescents of a small Ohio city of about 10,000 population. Forty-one of the subjects were enrolled in the

parochial high school, and the remainder in the single public high school. All were enrolled in Grades 7 through 12. The majority completed the test in the 60 minutes set aside by the two systems for testing.

Even though the items were carefully prepared, no assumptions were made about their validities. Instead of accepting the a priori need categories as valid and then scoring each case according to keys prepared for the 12 postulated needs, a method of factor analysis of items was used so as to permit highly correlated items to emerge as clusters. Factor analysis of items not only provided evidence of the factorial purity of each item, but it also served as a test of the implied hypothesis that the responses to the test fall into 12 major need categories.

A random sample of 200 cases, male and female combined, and stratified according to grade in school, was drawn from the 725 completed tests and the "Yes, No" and "No, Yes" response patterns were factored by the Wherry-Gaylord iterative method of isolating oblique factors and obtaining approximate factor loadings for each item (5). Seven oblique factors emerged. Correlations among these were computed, and the transformation matrix for converting projections on oblique axes to projections on orthogonal axes was secured by the successive part-correlation procedure of Wherry and Winer (6). The oblique factor matrix was multiplied by the transformation matrix. The obtained orthogonal axes were further rotated orthogonally by a graphic method, similar to that described by Zimmerman (7), in order to maximize the loadings of items on the factor to which they appeared to belong and to minimize their loadings on all other factors. One of the factors could not be identified, and all loadings on another were reduced to values below .50 by rotation. Identification of the remaining factors proceeded directly from inspection of items having high loadings on the one factor and low loadings on all others. Because many loadings were quite large, only those of .50 or larger were used to identify factors.

Results

Five factors were tentatively identified. None of the a priori need categories emerged with all items intact, and some either did not emerge or were unrecognizable. Finally, one strong item-cluster emerged which was unpredicted and quite different from any of the a priori categories.

Seventeen items with positive loadings ranging from .50 to .70 clustered together to define factor 1. Boys' form items defining this factor and their loadings are as follows:

Factor I

Item	*Loading*	*Statement*
10	.50	Bill is always welcome to go around with a bunch of boys he knows.
12	.57	Larry is different from the other boys.
16	.68	The boys in Murray's crowd think a lot of him.

FACTOR I (*continued*)

Item	*Loading*	*Statement*
26	.59	Chuck has one loyal friend who will stand by him no matter what they say.
27	.64	Al runs almost every activity that goes on in his school.
38	.63	Older people usually know how Andrew feels about things.
47	.63	Pat can succeed at most things better than his boy-friend.
48	.60	Most of Calvin's teachers are very fond of him.
50	.56	Older people like to have Sidney around.
58	.52	Mark feels at home with older people.
61	.70	Art's teachers feel that he is a fine person.
62	.55	Herb usually succeeds when he works hard for what he wants.
65	.63	The boys and girls almost always help Dan when he needs help.
68	.53	The other boys and girls look up to and admire Jack.
82	.56	Arthur's teachers give him praise now and then.
84	.62	Oliver and his boy friend usually do what Oliver thinks is best.
90	.55	Andy has a boy friend who thinks Andy is tops in just about everything.

Factor I appears to be a broad need for acceptance, approval, and recognition from both adults and like-sexed peers. Three of the items defining factor I were originally written as acceptance items, two each as affection, belonging, and recognition, and one as approval. The goal common to all items in the cluster, regardless of their original intent, appears related to maintaining or securing positive attitudes of others toward self. Items 47 and 62, originally written as achievement items, probably emerged with this cluster because the subjects responded to them as if a measure of success was a pathway to more major goals of acceptance, approval, and recognition. Factor I was identified as a need for *recognition-acceptance.*

Thirteen items with loadings from .51 to .92 clustered together to define factor II:

FACTOR II

Item	*Loading*	*Statement*
9	.92	Hank has a girl who seems to understand him.
23	.90	Will has a girl who gives him sympathy and encouragement.
33	.57	When a crowd of boys and girls are having fun together, they like to have Ray along.
36	.54	The boys and girls often let Melvin know how much they like him.
42	.72	Frank has a lot of influence on his girl friend.
51	.56	Phil is the leader when boys and girls get together.
55	.87	Edwin has a girl who thinks he is pretty special.
60	.56	Tom has a girl friend who seldom tells him what to do.
64	.88	Michael's girl tells him she is proud of him.
79	.59	Forest has a girl all his own.
83	.51	Craig can date almost any of the girls he knows whenever he tries.
85	.61	Sandy and his girl go to the same places and do the same things the other couples do.
86	.88	Lewis has a girl who lets him know she really likes him.

This is the unpredicted factor; it includes almost all of the items concerning face-to-face and group relations with members of the opposite sex. Factor II appears to be a need to be accepted and liked by the opposite sex. The majority of the items defining this factor concern relations with individual members of the opposite sex and imply that the subject is a positive goal for opposite sex peers. Factor II was identified as a need for *heterosexual affection and attention.*

Seven items with loadings from .56 to .82 clustered together to define factor III:

FACTOR III

Item	*Loading*	*Statement*
6	.78	Charles can often make his parents change their minds.
21	.59	The people at home treat Steve like a grown man.
25	.57	Leroy does almost everything the other boys and girls do.
32	.68	Ron has succeeded in getting older people to treat him like an adult.
34	.82	Chris can get grown-ups to do some things he wants.
40	.56	When Allan tries, he can get his parents to see some things his way.
71	.67	Nelson gets his way when he really wants it.

Three of the items defining factor III were originally written as dominance items, two as achievement, one as conformity, and one as recognition. Common to all, however, are behaviors directed toward independence from adult supervision as well as emancipation from the role of a child especially in the family setting; also common to all items is a degree of dominance behavior. Factor III was identified as a need for *independence and dominance in relationships with adults.*

Listed below are the seven items which clustered together to define factor IV. Loadings range from .63 to .80.

FACTOR IV

Item	*Loading*	*Statement*
1	.80	Luke almost always stays out of trouble.
29	.67	Gary does most of the things he is supposed to do.
44	.64	Louis goes to his family for advice; he doesn't decide many things all by himself.
49	.63	Other boys say Gordon is the strongest boy in town.
63	.72	Carl behaves like older people want him to.
67	.67	It bothers Floyd if he doesn't do his best.
77	.66	Instead of just getting by, Adam tries to do his best.

Items 67 and 77 were written to represent behavior directed toward self-realization (to learn, understand, perform to the best of one's ability), and items 29 and 63, to reflect conformity behavior (to behave according to

others' expectations; to be like others in appearance, behavior, attitudes, ideals). Items 1, 44, and 49 were written to represent behaviors oriented toward approval, dependence, and recognition, respectively. Common to all, however, are standards and circumstances usually endorsed by adults. Factor IV, therefore, appears to reflect a need to behave according to adult standards and expectations of conduct. It was identified as a need *to conform to adult expectations.*

Two items defined factor V:

FACTOR V

Item	*Loading*	*Statement*
13	.58	William doesn't have to study to get good marks.
28	.54	Arnold gets some of the best marks in his class.

Both of the items defining factor V were originally written to represent achievement in school. A probable reason why other achievement items did not emerge also to define this factor may be that for the subjects these two school-related items were the clearest pathways leading to satisfaction of achievement needs. Factor V was identified as a need for *achievement* related primarily to school achievement.

Only three items were highly loaded on the sixth factor:

FACTOR VI

Item	*Loading*	*Statement*
46	.53	The other boys listen to Hal when he makes suggestions.
73	.64	Bert goes to one of the best schools in this part of the state.
78	.68	Paul's family approves of most things he does.

Items 46, 73, and 78 were originally written to reflect dominance, belonging, and approval behaviors, respectively. Although factor VI may be related to dominance and approval needs, it was decided to leave this factor unidentified.

All loadings on the seventh factor were reduced to values below .50 by graphic rotation, first against factor I, and then against all others. The seventh factor was regarded as a residual factor.

A 100-item pilot test of factors I through V was used to obtain reliability estimates of these factors. The pilot test included the highly loaded items which had served to identify the factors, together with new items written to represent each. The highly loaded items served as models for the new items, and as many new ones were written as were necessary to provide a total of 20 for each factor. The pilot test was administered to a new group of 567 subjects in grades 7 through 12 of the same public high school where the original data were obtained seven years earlier. Factor scores were determined for 100 cases chosen at random, and Kuder-Richardson (Case III) reliabilities of .78, .91, .85, .82, and .84 were obtained for factors I through V, respectively.

To summarize the results, the implied hypothesis that responses to the 90 experimental items are classifiable into 12 independent need categories was not confirmed by a factor-analytic method. Some of the items originally included in the a priori need categories of acceptance, approval, belonging, and recognition clustered together to define a broader category identified as recognition-acceptance (factor I). The three a priori categories of independence, conformity, and achievement were confirmed as situation-specific categories of independence-dominance with regard to adults, conformity to adult expectations, and achievement in school (factors III, IV, and V). A large group of items emerged from the pool to define the unpredicted category, heterosexual affection and attention (factor II). Five a priori categories, affection, dependence, dominance, self-realization, and to be understood, were not confirmed as such.

Discussion

The results of the present study contributed much information crucial to the development of a group test of needs. In addition to serving as a method of testing the hypothesis that responses to the experimental items are classifiable into 12 need categories, the factor analysis served to validate the items in terms of whether or not they tap the response categories they were intended to tap. For example, although the item, "Leroy does almost everything the other boys and girls do," was designated to represent conforming behavior, it emerged with a cluster of items clearly related to independence and dominance relationships with adults. In all probability, the subjects' perceptions of this item, as well as their responses to it, were related to independence and dominance rather than to conformity. As far as personality test construction in general is concerned, the selection and grouping of items into subtests on the basis of face validity alone may be an important source of error which should be controlled. Factor analysis of items suggests itself as a method for such control.

The present study was limited in that it did not result in a validated needs test accompanied by suitable normative material. It did, however, indicate the feasibility of further research on the pilot test with a view toward establishing both predictive and concurrent validity.

The study did not make clear why affection, dependence, dominance, self-realization, and to be understood were not confirmed as need categories. It may be that they are neither basic or independent needs, or that they were primarily represented by relatively invalid items. In support of item invalidity is the fact that 41 items did not cluster together or contribute to existing clusters; they were lost in the initial iterative process because they elicited few "Yes, No" and "No, Yes" responses from the subjects. The more prevalent "Yes, Yes" and "No, No" responses to these noncontributing items, however, remained without meaning because none of them appeared among the existing "Yes, No" and "No, Yes" clusters. A second attempt to write

items representing certain of the unconfirmed categories such as dependence, dominance, nonheterosexual affection, and self-realization might be fruitful. An attempt also might be made to broaden factors III, IV, and V by writing additional items which would extend the categories beyond the specific situations which presently define them.

Summary

A 90-item experimental test of 12 a priori need categories, representing 70 specific psychological needs of adolescents cited in the literature, was administered to the in-school adolescents of a small midwestern city. Responses to the items were then factor analyzed so as to permit highly correlated items to emerge as clusters. The hypothesis that the responses are classifiable into 12 independent need categories was not confirmed. Five tentatively identified orthogonal need factors were isolated: (I) Recognition-acceptance, (II) Heterosexual affection and attention, (III) Independence-dominance with regard to adults, (IV) Conformity to adult expectations, and (V) Academic achievement. Administration of a pilot test of the five factors resulted in Kuder-Richardson (Case III) reliabilities of .78, .91, .85, .82, and .84 for factors I through V, respectively.

References

1. Lucas, C. M. An emergent category approach to the analysis of adolescent needs. Unpublished doctoral dissertation, Ohio State Univer., 1951.
2. Murray, H. A. Facts which support the concept of need or drive. *J. Psychol.*, 1937, 3, 27-42.
3. Murray, H. A., and others. *Explorations in personality.* New York: Oxford Univer. Press, 1938.
4. Rogers, C. R. *A test of personality adjustment.* New York: Association Press, 1931.
5. Wherry, R. J., & Gaylord, R. H. The concept of test and item reliability in relation to factor pattern. *Psychometrika,* 1943, 8, 247-269.
6. Wherry, R. J., & Winer, B. J. A method for factoring large numbers of items. *Psychometrika,* 1953, 18, 161-179.
7. Zimmerman, W. S. A simple graphical method for orthogonal rotation of axes. *Psychometrika,* 1946, 11, 51-55.

EXPERIENCE AND THE DEVELOPMENT OF MOTIVATION: SOME REINTERPRETATIONS[1]

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A recent issue of the *Saturday Evening Post* carried a cartoon that some of you may have noted. It depicts a boy entering his house, perhaps from school, where his father is sitting with his paper. The boy appears to be fixing his father with an accusing glare. The punch-line reads, "Somebody goofed. I'm improperly motivated."

This cartoon depicts the vantage point from which I have been examining what we think we know about the relation between experience and motivation. When a child's behavior fails to fit the standards somebody in our society holds for him, it is pretty well agreed among us who are supposed to be experts on human nature that "somebody goofed." And that somebody is usually considered to be a parent.

The question is: what is the proper formula? If one examines the accruing evidence relevant to what has been the dominant conception of the experiential sources of motivation, one can hardly escape the conclusion that this conceptual scheme needs some revisions. If we based our child-rearing entirely on our dominant theory of motivational development, we would probably goof as often and as badly as run-of-the-mill parents.

Today I wish, first, to remind you of three of the most basic and general of the propositions in that theory of motivation which has been dominant for the past 30 to 40 years. These are propositions which, although

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[1] Earlier versions of this paper were read at the Eleventh Annual Institute in Psychiatry and Neurology of the Veterans Administration Hospital at North Little Rock, Arkansas, 27 February 1959, and at colloquia of the Department of Psychology at Vanderbilt University and of the Department of Psychiatry at the Medical School of Colorado. The paper was prepared in connection with a survey of the implications of the work in behavioral science for childrearing which has been supported by the Russell Sage Foundation.

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stated in somewhat varied forms, have been shared by both psychoanalysts and academic behavior theorists. Secondly, I wish to cite evidence which calls these propositions into question, and thirdly, to suggest tentatively three new interpretative principles which appear to me to be congruent with a large number of facts and which have interesting implications.

Our conceptions of motivation have traditionally been concerned with three large questions. (a) Why does an organism or person become active? (b) Why does the organism or person act one way rather than another? and (c) How do you get the organism or person to change his behavior to something conceived to be more desirable or appropriate?

The Dominant Theory

Drive

According to our dominant theory, it is claimed, first of all, that "all behavior is motivated," and that the aim or function of every instinct, defense, action, or habit is to reduce or eliminate stimulation or excitation within the nervous system. It is not easy to state when this view was first presented. Signs of it appear in the seventh chapter of Freud's *Interpretation of Dreams* (15) in 1900, and the idea is full-blown in his paper entitled *Instincts and Their Vicissitudes* (17) in 1915. The idea also appears in Woodworth's *Dynamic Psychology* (68), published in 1918, where the term *drive* was first introduced into the glossary of American psychology. The idea was full-blown in Dashiell's *Fundamentals of Objective Psychology* (11) in 1928.

Although Freud (17) believed that the source of motivation lay outside the domain of psychology in physiology, American psychologists, untroubled by such limits to their domain, have gone on to answer the first question concerning what motivates organisms to become active by saying that they are *driven*. Organisms have been conceived to be driven, first, by those so-called primary, inner stimuli which arise from homeostatic inbalances or needs. With no shame whatsoever, psychologists have long cited the evidence from the work of such physiologists as Claude Bernard (5) and his successors, and especially of Walter B. Cannon (10), and also of the psychologist Curt Richter (59) to document this answer. Organisms are driven, second, by various forms of intense and painful external stimulation. It has been assumed that these two forms of stimulation arouse an inner state of excitement which has usually been called *drive*.

It is also assumed, as the proposition that "all behavior is motivated" implies, that the organism would be inactive unless driven by either inner or outer stimuli. Freud (17) has been highly explicit about this assumption, and the assumption lies implicitly behind the notion of conditioned or learned drive in behavior theory and behind the traumatic notion of anxiety in psychoanalysis. It is sometimes obvious, of course, that animals and people are sometimes active when it is hard to see how either homeo-

static drive or painful external stimulation could be operative. It is then assumed that some of the weak, innocuous stimuli present must have been associated in the past with either painful stimuli or homeostatic needs. In such a way the weak stimuli which are present must have acquired the capacity to arouse the drive, often now called anxiety by psychologists as well as psychoanalysts, and it is such acquired or conditioned drive that is conceived to activate the organism.

Such conditioned drive or anxiety has been well demonstrated in the laboratory. Before World War II, Miller (45, 46) at Yale showed that rats which had been repeatedly shocked in a white box would, when later returned to the white box, make an effort to escape. Moreover, in the course of these efforts, they could be got to learn new skills such as that of turning a wheel to open a door. Rats which had not been shocked in the white box made no such efforts to escape. In another demonstration Solomon and Wynne (64) have shown that dogs which have experienced a tone or a buzzer paired a few times with a subtetanizing shock will run away from that tone or buzzer for hundreds of trials, with the average reaction time of starting continuing to decrease through 600 such trials. In my own work (31) rats fed irregularly in infancy ate more and sometimes (32) hoarded more than their litter-mate controls in adulthood after a period without food. Here, as I conceived it, the cues of hunger were conditioned to intense hunger excitement during the infantile experience. In adulthood the conditioned hunger drive facilitated the rate of eating and, sometimes, hoarding.

Such work has demonstrated that this notion of conditioned drive or anxiety, which goes back to the work of Bechterev (2) and Watson and Raynor (67), has a solid basis in reality. But in what has been the dominant theory of motivation, as epitomized by Freud's (18) later traumatic theory of anxiety and by the Hull (30) and Dollard-Miller (13, 47) theory of acquired drives, conditioning is conceived to be the only way in which an organism can become fearful of innocuous stimuli.

Habit

Habit has been the answer to the second question concerned with why an animal or person acts one way rather than another. The organism is controlled by the habits which have served to reduce drive in the past when that organism was in the presence of the inner and outer drive stimuli and the cue stimuli impinging upon him at any given now. Under the term *habit,* I am including psychoanalytic modes, which have supposedly been fixated during infancy in the course of either too much gratification or too much frustration, and I am including also ego-defenses, or anxiety equivalents, and cathexes, as well as the instrumental responses and traits commonly investigated in psychological laboratories.

Changing behavior has been conceived to be a matter of motivating the organism with either punishment or homeostatic need to make the desired

behavior which can then be reinforced by arranging for it to reduce the drive aroused by the punishment or the need. Although the conditions and conceptions of psychotherapy in the clinic differ considerably from the conditions and conceptions of the behavior theorist investigating learning in laboratory animals, in either case it is conceived that motivation is a necessity, and motivation means changing the emotional or drive conditions which are quite extrinsic to either the instrumental behavior or the cognitive, informational processes concerned.

This dominant theory has been a conceptual edifice of large dimensions and of considerable detail. It has provided a plausible account of both personality development and social motives. The experimental facts of homeostasis and of conditioned drive and fear are sound. Nevertheless, it has become more and more evident in the past 10 years that some of the basic assumptions of this dominant theoretical scheme and some of the explanatory extrapolations contradict facts and call for reinterpretation.

Reinterpretations

Is All Behavior Motivated?

The first of the assumptions to be called into question is the one that *all behavior is motivated* and that *organisms become inactive unless stimulated* by homeostatic need or painful stimulation or conditional stimuli for these. A large variety of observations contradict this assumption and imply spontaneous molar activity. Beach (1) has reviewed the observations of play in the young to show that playful activities are most likely to occur when either young animals or children are homeostatically satisfied and also comfortably warm. The very occurrence of either homeostatic need or strong external stimulation stops play and turns the young animal or child to activities calculated to relieve such stimulation. Berlyne (3, 4) has shown that well-fed and watered rats will explore areas new to them if given only the opportunity. Montgomery (49), moreover, has shown that hunger and thirst tend to limit the exploratory behavior of rats rather than facilitate it, and Montgomery and Monkman (50), as well as others, have shown that conditioned fear inhibits exploration. Harlow, Harlow, and Meyer (23) have demonstrated that well-fed monkeys will learn to unassemble a three-device puzzle with no other drive and "no other reward than the privilege of unassembling it." In another study Harlow (20) found two well-fed and well-watered monkeys worked repeatedly at unassembling a six-device puzzle for 10 continuous hours, and they were still showing what he characterized as enthusiasm for their work on the tenth hour of testing. From his observations of the human child, moreover, Piaget (55) remarks repeatedly on the enthusiastic and repeated performance of such emerging skills as the release of a toy, sitting up, standing, etc.

Such evidences of spontaneous behavior, which is unmotivated in the traditional sense, have led to the naming of such new motives as a curiosity drive by Berlyne (4), an exploratory drive by Montgomery (48), and exteroceptive and curiosity drives by Harlow (21). I would like to object that merely naming such drives explains nothing. If we continue, we shall be revisiting McDougall's (44) practice of postulating a separate drive for almost every variety of activities. Let us stop with noting that such observations do contradict our assumption that organisms will become inactive unless driven by homeostatic needs and painful stimuli and give up this ancient Greek notion that living matter is inert substance to which motion must be imparted by extrinsic forces. We can then embrace the thermodynamic conception of living things as open systems of energy exchange which exhibit activity intrinsically and upon which stimuli have a modulating effect, but not an initiating effect.

This notion of activity being intrinsic in living tissue is receiving support from studies of organ systems as well as studies of molar organisms. The EEG, for example, shows that brain cells are continuously active (33, 58). In sleep the slow waves of large amplitude are taken to imply that large numbers of cells are firing synchronously, and the effect of waking and stimulation and exciting the brain-stem-reticular formation is to asynchronize this firing which shows in rapid waves of low magnitude (42).

Granit (19) points out that the spontaneous firing of retinal cells increases with dark adaptation and thereby functions to prevent the deafferentization of visual contex with darkness. Twenty years ago, this spontaneous firing was considered, at worst, to be due to some failure of experimental control, or at best, noise in the channel of information. Recently, the Laceys (36) have found spontaneous fluctuations of sudomotor activity and cardiac activity which they also see as functioning in the control of the organism's relations with its environment. Especially intriguing is their notion that the carotid sinus mechanism functions as a feedback loop which participates in the directing of attention inward or outward by inhibiting or facilitating receptor inputs. But the point of mentioning these evidences of spontaneous activities of organ systems here is merely to help inter for good the notion that activity of living systems requires homeostatic need or painful external stimulation and to foster the idea that to live means to be active in some degree.

Reinforcement

This idea of activity being intrinsic in living organisms has implications for our conception of reinforcement. It makes it unnecessary to see all activity as a matter of either reducing or avoiding stimulation which is implied in the assumption that organisms become inactive unless stimulated. This is a second fundamental assumption of the dominant theory which has been shared by psychoanalysts and behavior theorists alike.

On the one hand, there is still a place for drive reduction. It is clear that under conditions of homeostatic need and painful stimulation, and perhaps under circumstances when the conditions of stimulation are changing with too great rapidity, both animals and persons learn techniques and strategies leading to gratification or reduction in external stimulation. The evidence that led Thorndike to formulate the "law of effect" is as convincing as ever. Moreover, in association with reductions of homeostatic need, animals and men may also learn cathexes or emotional attachments. The facts referred to are those highly familiar in secondary reinforcement (30, 54).

On the other hand, the facts implying that organisms show spontaneous molar activity also imply that, when animals and human beings have been living under conditions of low and unchanging stimulation for a time, increases of stimulation become reinforcing. Butler has shown that rhesus monkeys will learn quite complex discriminations with the only reward being a peek through a glass window (7) at the things in the next room or a few seconds of auditory experience (8). Berlyne (3) has shown that, the greater the variety of stimulation in an area which rats are permitted to explore, the longer they continue their explorations.

Especially important in this connection are the studies of human behavior under conditions of minimal variation in stimulation. I refer to the studies of perceptual isolation by Bexton, Heron, and Scott (6) at McGill and also the work of Lilly (41). At McGill, college students were paid 20 dollars a day to do nothing. They lay for 24 hours a day on a comfortable bed. The temperature was optimal and constant. Eyes, ears, and hands were shielded to minimize stimulus variation. Few subjects could endure more than two or three days of such conditions. They developed a desire for variation which was almost overwhelming.

While interpreting such facts in terms of a multiple set of drives for curiosity, exploration, or stimulation will get us only to a redescription of them, Hebb's (26) notion of an optimal level of activation—and, I would like to add, stimulus variation below which *increases* are reinforcing and above which *decreases* are reinforcing—is an integrative conception of fair magnitude. Moreover, the drive-reduction principle of reinforcement may be seen to be but half of this more general curvilinear principle.

But this is probably not the whole story. It looks as if there were natively both positive and negative forms of exciting stimulation. Sheffield, Roby, and Campbell (61) have argued that the reinforcing effect of eating is not a matter of reduction of the hunger drive but rather a matter of the positive value of the consummatory act of eating. Moreover, Sheffield, Wulff, and Backer (62) have shown that male rats will learn mazes to get to females in heat even when they are allowed only intromission but not allowed to continue coitus to the point of drive-reducing ejaculation. From the fact that Davis (12) and his collaborators at Indiana have shown that showing pictures of nude women to college males increases excitement as shown by

increased palmar conductance and the arrest of EEG-alpha, it is clear that such stimulation is exciting rather than excitement-reducing. Young (69) has long emphasized the importance of the hedonic quality of experience for reinforcement, and he has shown that speed of running in rat subjects increases with the concentration of sucrose in the incentive drink.

The suggestion that the two forms of excitation, one positive and one negative, are built into organisms comes also from the work of Olds and Milner (53). Electrical stimulation of the septal area is positively reinforcing, but electrical stimulation of the brain-stem reticular formation is negatively reinforcing. Perhaps, it is not without significance that the septal area is part of the old olfactory brain which has been considered to have an especially important part in the mediation of sexual and consummatory behavior in mammals. At any rate, it looks as though certain types of stimulation may be positively reinforcing even though they be intense and exciting. This may mean that the curvilinear principle may be limited in its domain to strong stimulation via the exteroceptors when homeostatic needs are minimized.

The suggestion of innate, positive, and negative exteroceptive stimulation comes secondly from recent work by Harlow (22). It has been customary to see an infant's cathexis or love for its mother developing as secondary reinforcement largely out of its feeding experiences. Freud (16), of course, contended that the pleasure from stimulation of the oral erogenous zone furnished the experiential basis for both pleasure-sucking and maternal attachment, a contention which contradicted his most definitive formulations of drive theory (17). The fact that an infant must suck for its nourishment, according to libido theory (16, p. 587), merely guaranteed discovery of the pleasures of oral stimulation. Behavior theorists have seen both sucking and love of mother as forms of secondary reinforcement deriving from the fact that the child satisfies its hunger by means of sucking the mother's breasts (51, pp. 137ff.). Harlow (22), however, has recently compared the degree of attachment of young monkeys to a wire mother-surrogate on which they nursed at a bottle with attachment to a padded and cloth-covered mother-surrogate on which they received nothing but the feel of the softness. In terms of the amount of time spent on each of the two mother-surrogates, the monkeys showed more than 10 times the attachment to the soft-padded surrogate as to the wire surrogate. When various fear-evoking stimuli were presented to the baby monkeys in their cages, it was to the padded and cloth-covered surrogate that the frightened, infant monkey turned, not to the wire surrogate on which it had been nursed. Harlow argues from these findings that it is the sensory quality of softness which gives the reinforcement. His study suggests, moreover, that it is important to investigate the capacity for various kinds of stimuli for positive and negative reinforcement in the very young. Pratt (57) cites a monograph by Canestrini (9) on the sensory life of the newborn for an

observation that certain stimuli are associated with decreases in the rate of the heart rate, and are therefore pleasant, while others are associated with increases in heart rate and are unpleasant.[2] In view of the finding by Davis (12) and his collaborators that seeing a picture of a nude female results in reduction in the heart rate of male college students, it is possible that this physiological indicator may provide a technique for determining the direction of the reinforcing effect of stimuli in the newborn. At any rate, what is suggested is that McDougall's (44) old notion of natively positive and negative values for receptors inputs be reexamined.

Conditioned Fear and Anxiety

The third assumption that I wish to examine in the light of empirical evidence is the notion that fear and anxiety are *always* inculcated as a consequence of traumatic experiences of helplessness in the face of homeostatic need or painful external stimulation. Note that I am not denying that such conditioned fears do exist. I am only questioning the word *always* . . . are always inculcated as a consequence of traumatic experiences.

The first relevant studies go way back to the 1920's. Harold and Mary Cover Jones (34) attempted to test the claims of Watson (66) and Watson and Raynor (67) concerning conditioned fears. They exposed their subjects of various ages, ranging from early infancy to adult, to a large but sluggish and harmless bull-snake. Fear of the snake was exceedingly common among adults, teenagers, and latency-age children, but it was absent in children below three years of age. It began to appear among children older than three and was typical of children six and older. From the fact that the fear appeared at a younger age in those of higher intelligence than those of lower intelligence, the Joneses argued that fear of snakes is a response which comes automatically into the developing child's repertoire through maturation. This remains as an alternative hypothesis to that of conditioned fear.

A study by Frances Holmes (29), which is seldom cited, calls both of these interpretations into question. Holmes compared the fearfulness of the children of lower-class background, who were attending a day nursery, with the fearfulness of children of upper-class background, who were attending a private nursery school. She got her fear scores by indicating that the child could get some attractive toys with which to play by going into the dark room adjacent to the examining room, or by taking them off a chair situated beside that of a strange woman dressed in a large floppy black

[2] An examination of Canestrini's (9) monograph shows that Pratt was mistaken in stating that Canestrini remarked upon decreases in heart rate being associated with pleasure, but some of his published kymograph records do indicate decreases in heart rate. It may well be that heart rate could serve as an indicator of the emotional value of various sensory inputs, and these might be tested for their reinforcement values. I am indebted to Dr. William Gerler for reading this monograph carefully to check my own impressions of Canestrini's text.

hat and a long gray coat, or by climbing along a plank some three feet off the floor. If the child started immediately for the toys, he got a score of one for that item. If he hesitated but ultimately went ahead on his own, he got a score of two. If he would go only if accompanied by the examiner, the score was three. If he refused to go at all, the score was four. There were seven such situations. The results show that the fear scores of the lower-class children averaged only about half the size of those for the upper-class children, and the fear scores for boys were lower than those for girls. Yet it would be the lower-class children who had experienced the more homeostatic need and painfully rough treatment than the upper-class children, and the boys had probably experienced more painful experiences than the little girls. That intelligence is not the factor is shown by the fact that the fear scores showed a correlation of only about +.2 with mental age, and the differences were still significant when intelligence was partialed out. Something besides either conditioned fear or the correlation between fear and intelligence is required to make these results comprehensible.

Recently evidence even more contradictory to the notion of conditioned fears has been coming from the work of Seymour Levine. Levine, Chevalier, and Korchin (40) have compared the adult behavior of rats shocked and rats petted daily from birth to their 20th day with the adult behavior of rats left continuously in their nests with their mothers. When he started this work, Levine expected to find that the shocked animals would show traumatic effects of their shock experiences in heightened emotionality and damaged capacity to learn adaptive responses. On the contrary, the shocked animals, along with the handled animals, gained weight faster than those left in the nest (37, 38, 39, 40). Byron Lindholm, working with the writer, has repeated and confirmed this finding. Moreover, Levine's shocked and handled animals both showed less emotionality than those left continuously in the nest with their mothers, i.e., less emotionality in the sense that they defecated and urinated less frequently when placed in a strange situation. Finally, the shocked and handled animals, which have appeared alike in all of these experiments, learned an avoidance response more rapidly and drank more readily after 18 hours without water than did the rats left in the nest with their mother.

Clearly these results on both human children and rats imply that fear and anxiety must sometimes have some other basis than that of being associated with painful stimulation. As many of you know, Hebb (24, 25) has formulated a radically different explanation of fear which may be termed either an incongruity or a dissonance theory.

The facts which suggested Hebb's conception came largely from observing chimpanzees being raised under controlled conditions at the Yerkes Laboratory. Fear, defined as withdrawal behavior in response to the appearance of some object, does not appear in young chimpanzees until they

are approximately four months old. Then, the objects feared are familiar objects in unfamiliar guise. Fear of strangers is an example. This appears spontaneously to the first stranger seen, so it cannot be based on associating strangers with painful stimulation. Fear of strangers does not appear in chimpanzees—or in children, I might add—who have always been exposed to a large number of persons. While the avoidance response is unlearned, the familiar, expected aspects of objects must be learned. The young animal must have established as residues of his experience cortical firing patterns (or cognitive structures—whichever term you like) from which new receptor inputs can be incongruous. Consider the kinds of objects regularly feared. They are, for instance, the familiar keeper or experimenter in strange clothes, the experimenter in a Hallowe'en mask, a plaster cast of a chimpanzee head (which lacks, of course, the familiarly attached body), an anesthetized chimpanzee infant (from which the familiar patterns of motion are absent). On the other hand, objects which have never entered into the young chimpanzee's life may be strange without evoking withdrawal. In other words, the feared object is one which excites receptors in a fashion which is incongruous with the central, sequential pattern of neural firing which has accrued as a residue of the chimpanzee or human infant's past experience. Until the central pattern has been learned, incongruous stimulation is impossible.

Such a conception can well account for Holmes' findings that lower-class children are less fearful than higher-class children and that boys are less fearful than girls even though both lower-class children and boys of nursery school age are likely to have had the wider experience with the sorts of situations used by Holmes to evoke fear. It may well be that being shocked and handled provides a variety of experience which leaves the rat pups which have been subjected to it less disturbed by such things as open fields and 18 hours without water, but these effects may ultimately be found to be a matter of still another mechanism. It is too early to say.

Taking seriously this incongruity-dissonance conception of the genesis of fear leads to interesting reinterpretations of a great many of the motivational phenomena of child development. Consider these few. In considering separation anxiety, the incongruity principle makes it unnecessary to puzzle about how the absence of mother could be the conditional stimulus for the traumatizing and helpless distress that has been supposed to have occurred in her absence. In considering fear of the dark, it also becomes unnecessary to puzzle about how the absence of light stimulation could so widely have been associated with painful stimulation. Multiple mothering need not be seen as a traumatizing experience in the light of this conception, but rather as an innoculation against social shyness and fear. The timidity of the overprotected child and the social shyness of the rural mountain people get an explanation which has been difficult in terms of the theory of conditioned fear.

Motivation in Terms of the Incongruity-Dissonance Principle

This introduction of the incongruity-dissonance principle concludes the three reinterpretations I wish to present today, but I do wish to call your attention to the pervasive character of this incongruity-dissonance principle. It appears to have great explanation power which figures, in one guise or another, in several systematic theories, besides that of Hebb, all of which have been characterized as nondynamic.

Hebb's (25) theorizing is physiological, at least in a verbal sense, in that he conceives the residues of past inputs to be stored in semiautonomous, reverberating cerebral circuits which he terms *cell assemblies*. These cell assemblies are the neural analogue of concepts, and they get sequentially integrated into what he calls *phase sequences*. The sequential organization in time provides for the subjective phenomenon of expectation. When markedly incongruous receptor inputs disrupt this sequential organization, behavior is changed and the process is felt as unpleasant emotion. Slight degrees of incongruity, which can readily be accommodated, lend interest and may provide attractive problems, but the larger ones are repelling and perhaps even devastating.

Piaget (55, 56) utilizes very much the same incongruity notion to account for the development of intelligence and concepts in human children. In his system, the child comes at birth with certain sensory-motor coordinations which he terms *schemata*. Variation in stimulus situations call for adaptive *accommodations* or changes in these schemata, which changes are *assimilated* or stored as residues. Piaget also finds limited incongruities between central schemata and receptor inputs to be interesting and facilitative of growth, but incongruities which extend beyond the child's capacity for accommodation instigate withdrawal or fear and even terror. In Piaget's theory the child's gestalt-like conceptions of reality (space, time, and number) are schemata which develop through a continuous process of accommodations and assimilations and become fixed or static only when the child's schemata come to correspond so well with reality that no further accommodations are required. Here agreement among people is dictated by reality.

Helson (27, 28) has called the residues of immediate past experience in the typical psychophysical experiment an *adaptation level*. Both he and McClelland (43) have seen affective arousal to be a matter of the size of the discrepancy between receptor inputs and the adaptation level. Small discrepancies may be attractively pleasant, large ones repellingly unpleasant. As an example, some of you will readily recall having experienced the affective startle that comes when you have been set to pick up what you thought was a full pail, only to find it empty.

Festinger (14) has recently written a book entitled *A Theory of Cognitive Dissonance* in which he shows that a discrepancy between belief about

a situation and perception of that situation acts like a drive. The subject acts to reduce the *dissonance* by either withdrawing from the incredible situation or by changing his beliefs, and, not incidentally, he finds the dissonance highly unpleasant.

Rogers (60) has described the basis for anxiety as discrepancy between the "phenomenological field" and the perceived reality as represented by his two circles. Rogers' phenomenological field, however, is not the perceptually-given phenomenal field of such German phenomenologists as Delthei and Husserl. It is rather the inferred storehouse of past experience and represented in the present by expectations, aspirations, self-concept, and the like. Thus, his conceptual scheme appears to fall within the domain of the incongruity-dissonance principle.

Kelly's (35) *Psychology of Personal Constructs* also makes central use of this principle. The term *personal constructs* refers to the ways in which individuals construe and anticipate events. These each person derives from the way in which he has experienced such events in the past. When a person's constructions fail to predict events, this is disturbing, even anxiety-producing, and it motivates some kind of change, but the change may take place in defenses against such change of constructs or in avoiding such events, or in the constructs themselves.

Perhaps, it is worth noting in closing that this incongruity-dissonance principle makes both motivation and reinforcement intrinsic to the organism's relations with its environment, intrinsic, if you will, to the organism's information-processing. It is as if the organism operated like an error-actuated, feedback system where the error is derived from discrepancy between receptor-inputs of the present and the residues of past experience which serve as the basis for anticipating the future. The dominant view of the past half century has seen both motivation and reinforcement as extrinsic to the information-processing. This has put a tremendous burden of responsibility for the management of affective motivation on parents, teachers, and all those in positions of authority and control. Visions of man completely controlled, as exemplified by George Orwell's *1984,* are conceivable only by assuming that the extrinsic motivating forces of homeostatic need and painful stimulation are completely dominant. In this light the terror of the baby chimp at seeing his keeper in a Hallowe'en mask and the irritation of the believer when his beliefs are disconfirmed are perhaps symbols of hope. They may justify Abraham Lincoln's well-known dictum that "you can fool some of the people all the time, and all the people some of the time, but you cannot fool all the people all the time."

To return to the cartoon of the lad who was improperly motivated: Perhaps, the task of developing proper motivation is best seen, at least in nutshell form, as limiting the manipulation of extrinsic factors to that minimum of keeping homeostatic need and exteroceptive drive low, in favor of facilitating basic information-processing to maximize accurate anticipation of reality.

References

1. Beach, F. A. Current concepts of play in animals. *Amer. Naturalist,* 1945, 79, 523-541.
2. Bechterev, V. M. *La psychologie objective.* (Translated by N. Kostyleff) Paris: Alcan, 1913.
3. Berlyne, D. E. Novelty and curiosity as determinants of exploratory behavior. *Brit. J. Psychol.,* 1950, 41, 68-80.
4. Berlyne, D. E. The arousal and satiation of perceptual curiosity in the rat. *J. comp. physiol. Psychol.,* 1955, 48, 238-246.
5. Bernard, C. *Leçons sur les propriétés physiologiques et les alterations pathologiques des liquides de l'organisme.* Paris: Ballière, 1859. 2 vols.
6. Bexton, W. H., Heron, W., & Scott, T. H. Effects of decreased variation in the sensory environment. *Canad. J. Psychol.,* 1954, 8, 70-76.
7. Butler, R. A. Discrimination learning by rhesus monkeys to visual-exploration motivation. *J. comp. physiol. Psychol.,* 1953, 46, 95-98.
8. Butler, R. A. Discrimination learning by rhesus monkeys to auditory incentives. *J. comp. physiol. Psychol.,* 1957, 50, 239-241.
9. Canestrini, S. Über das Sinnesleben des Neugebornen. [Alzheimer, A. & Lewandowsky, M. (Eds.)] *Monogr. Gesamt. Neurol. Psychiat.* (Heft 5). Berlin: Springer, 1913.
10. Cannon, W. B. *Bodily changes in pain, hunger, fear, and rage.* New York: Appleton-Century, 1915.
11. Dashiell, J. *Fundamentals of objective psychology.* Boston: Houghton Mifflin, 1928.
12. Davis, R. C., & Buchwald, A. M. An exploration of somatic response patterns: stimulus and sex differences. *J. comp. physiol. Psychol.,* 1957, 50, 44-52.
13. Dollard, J., & Miller, N. E. *Personality and psychotherapy.* New York: McGraw-Hill, 1950.
14. Festinger, L. *A theory of cognitive dissonance.* Evanston, Ill.: Row, Peterson, 1957.
15. Freud, S. The interpretation of dreams (1900). In *The basic writings of Sigmund Freud.* (Translated by A. A. Brill) New York: Modern Library, 1938. Pp. 179-548.
16. Freud, S. Three contributions to the theory of sex (1905). In *The basic writings of Sigmund Freud.* (Translated by A. A. Brill) New York: Modern Library, 1938. Pp. 553-629.
17. Freud, S. Instincts and their vicissitudes (1915). In *Collected papers,* Vol. IV. London: Hogarth, 1950. Pp. 60-83.

18. Freud, S. *Inhibition, symptom and anxiety* (1926). Translated by H. A. Bunker as *The problem of anxiety*.) New York: Norton, 1936.

19. Granit, R. *Receptors and sensory perception*. New Haven: Yale Univer. Press, 1955.

20. Harlow, H. F. Learning and satiation of response in intrinsically motivated complex puzzle performance by monkeys. *J. comp. physiol. Psychol.*, 1950, 43, 289-294.

21. Harlow, H. F. Motivation as a factor in the acquisition of new responses. In *Current theory and research in motivation: a symposium*. Lincoln: Univer. of Nebraska Press, 1953. Pp. 24-49.

22. Harlow, H. F. The nature of love. *Amer. Psychologist*, 1958, 13, 673-685.

23. Harlow, H. F., Harlow, M. K., & Meyer, D. R. Learning motivated by a manipulation drive. *J. exp. Psychol.*, 1950, 40, 228-234.

24. Hebb, D. O. On the nature of fear. *Psychol. Rev.*, 1946, 53, 259-276.

25. Hebb, D. O. *The organization of behavior*. New York: Wiley, 1949.

26. Hebb, D. O. Drives and the CNS (conceptual nervous system). *Psychol. Rev.*, 1955, 62, 243-254.

27. Helson, H. Adaptation-level as frame of reference for prediction of psychophysical data. *Amer. J. Psychol.*, 1947, 60, 1-29.

28. Helson, H. Adaptation-level as a basis for a quantitative theory of frames of reference. *Psychol. Rev.*, 1948, 55, 297-313.

29. Holmes, Frances B. An experimental study of the fears of young children. In A. T. Jersild & Frances B. Holmes, Children's fears. *Child Develpm. Monogr.*, 1935, 20, 167-296.

30. Hull, C. L. *Principles of behavior*. New York: Appleton-Century, 1943.

31. Hunt, J. McV. The effects of infant feeding-frustration upon adult hoarding in the albino rat. *J. abnorm. soc. Psychol.*, 1941, 36, 338-360.

32. Hunt, J. McV., Schlosberg, H., Solomon, R. L., & Stellar, E. Studies on the effects of infantile experience on adult behavior in rats. I. Effects of infantile feeding frustration on adult hoarding. *J. comp. physiol. Psychol.*, 1947, 40, 291-304.

33. Jasper, H. H. Electrical signs of cortical activity. *Psychol. Bull.*, 1937, 34, 411-481.

34. Jones, H. E., & Jones, Mary C. A study of fear. *Child Educ.*, 1928, 5, 136-143.

35. Kelly, G. A. *The psychology of personal constructs*. New York: Norton, 1955.

36. Lacey, J. I., & Lacey, Beatrice C. The relationship of resting autonomic activity to motor impulsivity. In *The brain and human behavior*. Baltimore: Williams & Wilkins, 1958. Pp. 144-209.

37. Levine, S. Infantile experience and consummatory behavior in adulthood. *J. comp. physiol. Psychol.*, 1957, 50, 609-612.

38. Levine, S. Infantile experience and resistance to physical stress. *Science*. 1957, 126, 405.

39. Levine, S. Noxious stimulation in infant and adult rats and consummatory behavior. *J. comp. physiol. Psychol.*, 1958, 51, 230-233.

40. Levine, S., Chevalier, J. A., & Korchin, S. J. The effects of shock and handling in infancy on later avoidance learning. *J. Pers.*, 1956, 24, 475-493.

41. Lilly, J. C. Mental effects of reduction of ordinary levels of physical stimuli on intact, healthy persons. *Psychiat. Res. Rep.*, 1956, No. 5, 1-9.

42. Lindsley, D. B. Psychophysiology and motivation. In M. R. Jones (Ed.), *Nebraska symposium on motivation*. Lincoln: Univer. of Nebraska Press, 1957. Pp. 44-105.

43. McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. *The achievement motive*. New York: Appleton-Century-Crofts, 1953.

44. McDougall, W. *An introduction to social psychology*. Boston: Luce, 1915.

45. Miller, N. E. An experimental investigation of acquired drives. *Psychol. Bull.*, 1941, 38, 534-535.

46. Miller, N. E. Studies of fear as an acquirable drive: I. Fear as motivation and fear-reduction as reinforcement in the learning of new responses. *J. exp. Psychol.*, 1948, 38, 89-101.

47. Miller, N. E., & Dollard, J. *Social learning and imitation*. New Haven: Yale Univer. Press, 1941.

48. Montgomery, K. C. The relation between exploratory behavior and spontaneous alternation in the white rat. *J. comp. physiol. Psychol.*, 1951, 44, 582-589.

49. Montgomery, K. C. The effect of the hunger and thirst drives upon exploratory behavior. *J. comp. physiol. Psychol.*, 1953, 46, 315-319.

50. Montgomery, K. C., & Monkman, J. A. The relation between fear and exploratory behavior. *J. comp. physiol. Psychol.*, 1955, 48, 132-136.

51. Mussen, P. H., & Conger, J. J. *Child development and personality*. New York: Harper, 1956.

52. Olds, J. Physiological mechanisms of reward. In M. R. Jones (Ed.), *Nebraska symposium on motivation*. Lincoln: Univer. of Nebraska Press, 1955. Pp. 73-139.

53. Olds, J., & Milner, P. Positive reinforcement produced by electrical stimulation of septal area and other regions of the rat brain. *J. comp. physiol. Psychol.*, 1954, 47, 419-427.

54. Pavlov, I. P. *Conditioned reflexes.* (Translated by G. V. Anrep) Oxford: Oxford Univer. Press, 1927.

55. Piaget, J. *The origins of intelligence in children.* New York: International Universities Press, 1952.

56. Piaget, J. *The construction of reality in the child.* (Translated by Margaret Cook) New York: Basic Books, 1954.

57. Pratt, K. C. The neonate. In L. Carmichael (Ed.), *Manual of child psychology.* (2nd Ed.) New York: Wiley, 1954. Pp. 215-291.

58. Prosser, C. L. Action potentials in the nervous system of the crayfish: I. Spontaneous impulses. *J. cell. comp. Physiol.*, 1934, 4, 185-209.

59. Richter, C. P. Animal behavior and internal drives. *Quart. Rev. Biol.*, 1927, 2, 307-343.

60. Rogers, C. R. *Client-centered therapy.* Boston: Houghton Mifflin, 1951.

61. Sheffield, F. D., Roby, T. B., & Campbell, B. A. Drive reduction versus consummatory behavior as determinants of reinforcement. *J. comp. physiol. Psychol.*, 1954, 47, 349-355.

62. Sheffield, F. D., Wulff, J. J., & Backer, R. Reward value of copulation without sex drive reduction. *J. comp. physiol. Psychol.*, 1951, 44, 3-8.

63. Solomon, R. L., & Brush, Elinor S. Experimentally derived conceptions of anxiety and aversion. In M. R. Jones (Ed.), *Nebraska symposium on motivation.* Lincoln: Univer. of Nebraska Press, 1956. Pp. 212-305.

64. Solomon, R. L., & Wynne, L. C. Traumatic avoidance learning: acquisition in normal dogs. *Psychol. Monogr.*, 1953, 67, No. 4 (Whole No. 354).

65. Thorndike, E. L. *Educational psychology.* (Vol. I, *The original nature of man;* Vol. II, *The psychology of learning.*) New York: Teachers Coll., 1913.

66. Watson, J. B. *Psychological care of the infant and child.* New York: Norton, 1928.

67. Watson, J. B., & Raynor, Rosalie. Conditional reactions. *J. exp. Psychol.*, 1920, 3, 1-4.

68. Woodworth, R. S. *Dynamic psychology.* New York: Columbia Univer. Press, 1918.

69. Young, P. T. The role of hedonic processes in motivation. In M. R. Jones (Ed.), *Nebraska symposium on motivation.* Lincoln: Univer. of Nebraska Press, 1955. Pp. 193-237.

MOTOR PAIRED-ASSOCIATE LEARNING AND STIMULUS PRETRAINING[1]

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Several studies (e.g., 1, 2, 6, 7) have indicated that performance on a motor paired-associate task is facilitated if *S* first learns to associate distinctive verbal responses with the stimuli. Miller and Dollard's hypothesis of the acquired distinctiveness of cues (5) provides an explanation of this phenomenon and leads to the prediction that greater facilitation will result from (a) higher levels of learning in task I and (b) greater degrees of distinctiveness of the verbal responses learned in task I. The prediction is concerned with the effects of the transfer of specific associations; therefore, it is necessary to control the effects of performance set or nonspecific transfer in testing the prediction. It is assumed that the verbal responses produce cues and that these cues affect the similarity of the stimulus complexes. The probability that the cue-producing responses will be elicited in task II is presumably a function of the level of conditioning of these responses in task I. Further, if the cues are more distinctive than the stimulus complexes, the similarity of the complexes will be reduced by the addition of the cues and will be increased if the cues are less distinctive than the complexes.

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Experimental evidence relevant to the first part of the prediction is inconclusive (1, 4). With respect to the second part of the prediction, one study (2) failed to obtain support, but two experiments by Norcross (7) provided support.

The specific predictions tested in the present experiment were: (a) With performance set controlled, a high level of pretraining will lead to better performance on task II than a low level, and the low level will lead to better performance than no pretraining. (b) There will be greater facilitation in a group that has learned distinctive names for the stimuli than in a group that has learned similar names for them.

Six stimuli were used in task II, four of which were also used in task I. In task I, one group learned to associate distinctive nonsense syllables with the stimuli, and a second group learned to associate similar nonsense syllables with the stimuli. Each *S* learned the associations with two stimuli to a high criterion in task I. The other stimuli were presented only one third as many times as these two. In task II, *S*s learned to associate button-pushing responses with the six stimuli.

Method

Apparatus

The apparatus is essentially the same in operation and design as that described in detail by Spiker and Holton (9). It was designed to present motor paired-associate learning tasks in which *S* learns to associate push-buttons with stimulus lights differing in hue. It consists of four parts: a stimulus-exposure unit, a response unit, a control box, and a timing unit. It permits the presentation of one stimulus at a time for a selected anticipation time interval, followed by a timed joint-presentation interval during which the stimulus is presented jointly with an informational light beside the correct button, followed in turn by a timed interstimulus interval. The *S* is instructed to respond prior to the onset of the informational light. A bell sounds immediately if the response is correct, and whether or not it is correct, the informational light is automatically turned on at the end of the anticipation interval.

The response unit consists of a black panel on which six push-buttons are arranged in a semicircle. A small 115-volt pilot (informational) lamp is located beside each button. The buttons are numbered, starting at the left, from one to six with one-inch high white numerals.

The stimulus-exposure unit contains on its front face a single aperture, covered with flashed opal glass, through which stimulus lights differing in hue are filtered. Glass color filters obtained from the Corning Glass Co. were used. The stimuli were two reds, a light red (No. 2434) and a dark red (No. 2030); two greens, a light green (No. 3718 and No. 4784 together) and a dark green (No. 3384, No. 3389, and No. 5031); and two blues, a light blue (No. 5572) and a dark blue (No. 5543).

The task I response words were three-letter nonsense syllables. There were two pairs of similar syllables, *zim* and *zam* (pair A) and *wug* and *wog* (pair B), and two pairs of distinctive syllables, *lev* and *mib* (pair C) and *wug* and *zam* (pair D). In terms of common elements the within-pair similarity of the similar syllables is greater than their between-pair similarity, and both the between- and within-pair similarity of the distinctive syllables is low.

Procedure

Pretraining task. The *S*s were divided into two experimental groups. Group S learned to associate the similar syllables with the four stimulus lights used in task I, and group D learned to associate the distinctive syllables with these stimuli. The syllables of a given pair were associated with stimulus lights of similar hue.

The response unit was concealed throughout the pretraining task. The *S*s were first taught the appropriate set of nonsense syllables and were then told which syllable was to be associated with each of the four stimuli. The stimuli were then presented one at a time in blocks of eight stimulus presentations. When *S* gave an incorrect response, he was told the correct syllable in the "joint-presentation" interval and was required to repeat it aloud. The joint-presentation and interstimulus intervals were each 2 sec. The anticipation time was 4 sec. for the first 16 presentations, and was 2 sec. thereafter. During task I the bell signalled the end of the anticipation time, and correct responses were reinforced verbally by *E*.

In each block of stimulus presentations each of the two high-pretraining stimuli (the N_2 stimuli) was presented three times, and each of the two low-pretraining stimuli (the N_1 stimuli) was presented once. The learning criterion was two consecutive blocks with no errors to the N_2 stimuli, excluding the two blocks in which the anticipation time was 4 sec. Therefore, each *S* was given at least four blocks of stimulus presentations, and, whatever the number of blocks required to reach criterion, the N_2 stimuli were presented three times more often than the N_1 stimuli. All *S*s who failed to reach criterion within 20 blocks, excluding the first two blocks, were eliminated from the experiment.

Transfer task. Immediately after *S* reached the task I learning criterion, the response unit was placed in position in front of the stimulus-exposure unit and below the stimulus aperture. The procedure outlined along with the description of the apparatus was followed in task II. Only one response to each stimulus presentation was permitted. Training was continued until *S* reached a criterion of four consecutive errorless trials, or until he had been given 20 trials, whichever was sooner. A trial consisted of the presentation of all six stimuli in some order. A different order was used in each of the first six trials, after which the six orders were repeated. The anticipation time was 3 sec. throughout task II, and the joint-presentation and interstimulus intervals were each 2 sec.

Counterbalancing

To counterbalance syllable pairs with levels of pretraining, each of the two experimental groups was divided into two subgroups. A given pair of syllables was associated with the N_1 stimuli in one subgroup and with the N_2 stimuli in the other subgroup. These subgroups are designated S-I, S-II, D-I, and D-II, and each contained 18 *Ss*.

Each of the four subgroups was divided into nine further subgroups to counterbalance pairs of stimuli and pairs of buttons with the pretraining levels by the application of a Graeco-Latin square design. Each pair of stimuli and each pair of buttons was used once under each of the three pretraining levels in each of the four major subgroups. (The three pretraining levels were High, Low, and None or N_0.) The button pairs were buttons 1 and 4, 2 and 5, and 3 and 6.

Subjects

The *Ss* were 72 fourth, fifth, and sixth grade school children obtained in a single public school in Ottumwa, Iowa.[2] They were assigned to the experimental groups in a random manner. Twelve additional *Ss* were eliminated, two because of procedural errors, and 10 because of failure to reach the task I criterion within the allotted number of presentations. Six of these were eliminated from group S-I, two from group D-I, and two from group D-II.

Results

Pretraining Task

Two questions relevant to the experimental hypotheses may be answered by examining the task I data. First, since groups S-I, S-II, D-I, and D-II learned to associate different pairs of syllables with the N_2 stimuli, it is possible that they differed in the number of stimulus presentations required to reach the task I criterion. If there were such differences, it is likely that task II performance would be differentially affected by differences in performance set. Secondly, the criteria used to construct the syllables differing in similarity, while probably adequate for visually presented materials, may be inadequate for materials presented orally as in the present experiment. One measure which may be used to check the effective similarity of the syllables is the number of within-pair errors. A within-pair error is a response which is inappropriate to the stimulus presented, but appropriate to the stimulus similar in hue to the one presented.

[2] The writer is indebted to Mr. R. O. Wright, Director of Curriculum, Ottumwa Public School System, Ottumwa, Iowa, for his generous permission to use the *Ss* of this experiment. Thanks are also due Mr. Cecil M. Van de Venter, Principal, Horace Mann Elementary School, and his teaching staff, for their fine cooperation in providing facilities and for their assistance in many other ways.

The mean numbers of presentations of the N_2 stimuli required to reach the task I learning criterion are presented in the first line of Table 1. Group S-I required an average of about 36 per cent more presentations than the other groups, and the latter groups differed very little. Hence, the possibility of differential performance set must be considered in the analysis of the task II data.

TABLE 1

TASK I RESPONSE MEASURES

	Syllable Pairs			
Response Measures	*Pair A zim, zam*	*Pair B wug, wog*	*Pair C lev, mib*	*Pair D wug, zam*
Mean Presentations of N_2 Stimuli	50.67	68.00	50.33	49.00
Mean Within-Pair Errors to N_2 Stimuli	4.94	10.11	1.89	2.56

NOTE.—Pair A was associated with the N_1 stimuli in group S-I and the N_2 stimuli in group S-II. Pair B was associated with the N_1 stimuli in group S-II and the N_2 stimuli in group S-I. Pair C was associated with the N_1 stimuli in group D-I and the N_2 stimuli in group D-II. Pair D was associated with the N_1 stimuli in group D-II and the N_2 stimuli in group D-I.

The mean numbers of within-pair errors to the N_2 stimuli are given in the second line of Table 1. There were more within-pair errors on associations with pairs A and B, the similar pairs, than on those with pairs C and D, the distinctive pairs, and more on pair B than on pair A. Analysis of variance showed that the effect of syllable pairs was significant ($F = 9.90$; $df = 3, 60$; $p < .001$), and t tests, with the standard errors based on ms_w and with df of ms_w (3, p. 214), indicated that the mean for pair B was significantly greater than the other means ($t = 3.08$, 4.89, and 4.49 for the comparisons with pairs A, C, and D, respectively). Pair A did not differ significantly from pair C or D ($t = 1.82$, 1.42, respectively), and pairs C and D were not significantly different ($t < 1.00$). Hence, the effective within-pair similarity of pair B was greater than that of the other pairs, suggesting that the effect of similarity of syllables on transfer must be determined by comparison of individual pairs of syllables rather than combinations of pairs.

Transfer Task

A within-pair error measure of task II performance is appropriate to the tests of the experimental hypotheses, and the measure selected was the percentage within-pair errors, defined as 100 × number of within-pair errors on a given pair of stimuli divided by the total number of errors on that pair of stimuli.

The mean percentages are presented in Table 2, where a lower score reflects better performance. The best test of the effects of levels of pretraining is with groups D-I and D-II since the differences between these two groups on the task I measures were small and nonsignificant. Performance on the N_2 stimuli was about the same as that on the N_1 stimuli, but superior to that on the N_0 stimuli. This effect was statistically significant ($F = 5.26$; $df = 2, 36$). The mean for the N_0 level was significantly larger than the N_1 mean ($t = 2.79$; $df = 36$) and the N_2 mean ($t = 2.83$; $df = 36$), and the latter two means did not differ significantly ($t < 1.00$). Hence, both levels of pretraining with the distinctive syllables led to facilitation, but not to different amounts of facilitation.

TABLE 2

MEAN PERCENTAGE WITHIN-PAIR ERRORS ON TASK II

	LEVEL OF PRETRAINING		
Group	N_0	N_1	N_2
S-I	29.44	34.61	38.56
S-II	39.78	38.22	26.94
Both	34.61	36.42	32.75
D-I	43.61	39.39	31.28
D-II	49.11	28.28	36.06
Both	46.36	33.83	33.67

For the analysis of the effect of similarity of syllables, the possible differences in performance set among the groups were controlled by subtracting each *S*'s N_1 and N_2 scores from his N_0 score. This adjustment yields direct measures of the effects of specific transfer, since the effects of nonspecific transfer are subtracted out. The adjusted means are presented in Table 3, where a positive score represents facilitation. Pairs C and D have been combined, since the differences between these pairs on the task I measures were small and nonsignificant.

At the N_1 level there was greater facilitation with the combined distinctive syllables than with pair A or B, and slight interference with pair A. At the N_2 level there was as much facilitation with pair A as with the combined distinctive syllables and interference with pair B. Differences between pairs of means were tested at each level of pretraining separately by analyses of variance. At the N_1 level the mean for the combined distinctive syllables was significantly greater than the pair A mean ($F = 4.25$; $df = 1, 36$), but not significantly different from the pair B mean ($F = 2.02$; $df = 1, 36$). The latter two means did not differ significantly ($F < 1.00$). At the N_2 level the mean for pair B was significantly smaller than

TABLE 3

ADJUSTED MEANS SHOWING SPECIFIC TRANSFER EFFECTS

Syllable Pairs	Level of Pretraining	
	N_1	N_2
Pair A	— 5.17	12.83
Pair B	1.56	— 9.11
Combined Distinctive Syllables	12.53	12.69

the mean for pair A ($F = 6.79$; $df = 1, 36$) and the mean for the combined distinctive syllables ($F = 6.50$; $df = 1, 36$). The latter two means did not differ significantly ($F < 1.00$).

It was previously noted that both levels of pretraining with the distinctive syllables led to significantly greater facilitation than the no-pretraining condition. That is, pretraining with these syllables produced significant specific transfer. To test the significance of the specific transfer produced by pretraining with pairs A and B, the significance of the adjusted means for these pairs was determined with t tests, in which the standard errors of the means were based on the appropriate ms_w and with df of ms_w from the preceeding analyses. At the N_1 level the adjusted means for pairs A and B were not significantly greater than zero ($ts < 1.00$). At the N_2 level the mean for pair A was significantly greater than zero ($t = 2.16$; $df = 36$), but the pair B mean was nonsignificant ($t = 1.53$; $df = 36$).

DISCUSSION

Learning distinctive names for the stimuli led to facilitation of motor paired-associate learning in task II, but different levels of learning did not lead to different amounts of facilitation. With one of the pairs of similar syllables (pair A), facilitation was produced only by the high level of pretraining, and with the other pair (pair B) neither level of pretraining led to facilitation. The task I data indicated that pair A syllables were more distinctive than pair B syllables and suggested that the former were less distinctive than the pair C and pair D syllables; that is, pairs C and D were distinctive, pair B highly similar, and pair A syllables were of intermediate similarity. These findings suggest that the effect of level of pretraining depends on the similarity of the stimulus names learned in pretraining, more pretraining being required to produce facilitation the more similar the syllables are. There was no statistically reliable evidence that learning similar stimulus names led to interference with task II performance, but rather that it either had no effect or led to facilitation. These implications may be explained on the assumptions that, if the syllables are learned well

enough to transfer to task II, facilitation will be produced, and overlearning the syllables will not increase the probability that they will transfer and therefore will not increase the facilitation; and that a higher level of learning is required to bring about transfer of similar syllables than distinctive ones. The facilitation produced, when the syllables transfer can be accounted for by the mechanism postulated by Miller and Dollard (5), increased distinctiveness of stimulus complexes by the addition of response-produced cues to the complexes. An alternative mechanism has been suggested by Spiker (8). If the names transfer to task II, *S* uses them to rehearse the stimulus-response connections during the interval between stimulus presentations. If the names are highly similar, they will not be used for rehearsal; otherwise, they will be used, and facilitation will result.

Summary

It was predicted that better performance on a motor paired-associate task will result from (a) higher levels of verbal pretraining and (b) greater degrees of distinctiveness of the verbal responses learned during pretraining.

The *Ss* were fourth, fifth, and sixth grade school children. One group learned similar nonsense-syllable names for four stimuli in task I, and a second group learned distinctive nonsense-syllable names for the stimuli. Two of the association were learned to a high level, and the other two to a low level. In task II, *Ss* learned to associate button-pushing responses with six stimuli, including the four pretraining stimuli and two nonpretraining stimuli. The latter served as a performance-set control.

It was found that the effect of level of pretraining depended on the similarity of the task I responses. For distinctive syllables each level of pretraining produced better performance on task II than the control condition, but increasing levels did not produce increasing amounts of facilitation. For syllables of intermediate similarity (as determined by task I analyses) only the high level of pretraining produced better performance than the control condition. For syllables of extreme similarity neither level of pretraining produced facilitation.

References

1. Cantor, J. H. Amount of pretraining as a factor in stimulus predifferentiation and performance set. *J. exp. Psychol.*, 1955, 50, 180-184.
2. Gerjuoy, I. R. Discrimination learning as a function of the similarity of the stimulus names. Unpublished doctoral dissertation, State Univer. of Iowa, 1953.
3. Lindquist, E. F. *Design and analysis of experiments in psychology and education.* Boston: Houghton Mifflin, 1953.

4. McCormack, P. D. Negative transfer in motor performance following a critical amount of verbal pretraining. *Percept. mot. Skills,* 1958, 8, 27-31.

5. Miller, N. E., & Dollard, J. *Social learning and imitation.* New Haven: Yale Univer. Press, 1941.

6. Murdock, B. B., Jr. Effects of task difficulty, stimulus similarity, and type of response on stimulus predifferentiation. *J. exp. Psychol.,* 1958, 55, 167-172.

7. Norcross, K. J. Effects on discrimination performance of similarity of previously acquired stimulus names. *J. exp. Psychol.,* 1958, 56, 305-309.

8. Spiker, C. C. Stimulus pretraining and subsequent performance in the delayed reaction experiment. *J. exp. Psychol.,* 1956, 52, 107-111.

9. Spiker, C. C., & Holton, R. B. Associative transfer in motor paired-associate learning as a function of amount of first-task practice. *J. exp. Psychol.,* 1958, 56, 123-132.

AGE CHANGES IN THE RELATION BETWEEN ANXIETY AND ACHIEVEMENT

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Research on the relation between anxiety and school achievement has not yet produced fully understandable results. McCandless and Castaneda, using the Childrens' Manifest Anxiety Scale (CMAS) and the Iowa Every Pupil Test, found that at the sixth grade level high achieving pupils tended to score low on the anxiety test (4). In the fourth grade there was only a low relation of the same sort for girls, and at the fifth grade level there was no relation for either sex. These results have suggested to the authors that the relation between anxiety and achievement may change from grade level to grade level and that a more adequate differentiation of the tested population into achievement levels might serve to clarify these changes. The present investigation proposes a separate analysis of fifth and sixth grade children and a clearer demarcation of each grade into achievement levels to discover whether the inconsistencies in the earlier data can be explained.

PROCEDURE

The CMAS was administered in March 1959 to 366 fifth and sixth grade children in two rural consolidated schools located in a southeastern Michigan county. At the conclusion of grades four and five the combined average score earned on the California and Durrell-Sullivan Reading Achievement Tests was used to differentiate among these subjects by

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achievement levels. Those scoring above or below an arbitrary cutting line of the expected grade norm (e.g., 4.8 and 5.8 for the above two grades) were designated high and low achievers, respectively. In each grade the high and low achievers were randomly assigned to three high and three low achieving classes. Analysis of variance revealed that there was no statistically significant difference between the means of the six high achieving classes (three at each grade) with respect to the California Short Form IQs, nor between the means of the six low achieving classes. The mean IQs were 110.5 and 96.3 for the two achievement levels, respectively. Analysis of variance also demonstrated that the three high performing classes for each grade were from a common normal population with respect to the above reading measure and total California Achievement scores. The same was true for the three low performing classes for each grade. Approximately one grade separated the two performance levels at each grade with respect to reading and total achievement.

TABLE 1

MEANS AND STANDARD DEVIATIONS ON THE CMAS FOR BOYS AND GIRLS IN THE FIFTH AND SIXTH GRADES

	Fifth Grade			Sixth Grade		
	N	*M*	*SD*	*N*	*M*	*SD*
Boys	95	18.7	8.8	92	16.3	6.6
Girls	89	20.8	8.1	90	16.9	8.1

Results

The means and standard deviations on the anxiety scale for both grade and sex are presented in Table 1. The results of an analysis of variance performed on these data indicated significant effects for grade ($p = .001$), but no significant effects for either sex or the interaction between sex and grade. These results appear different from the original data presented by Castaneda, McCandless, and Palermo (3), who found significant sex differences only.

Table 2 presents the means for high and low achieving boys and girls of grades five and six. As can be seen, the high achieving fifth grade girl tends to be markedly more anxious than her low achieving peer. This finding is reversed at the sixth grade, where the high achieving girl is markedly less anxious than her low achieving peer.

An analysis of variance of these data is presented in Table 3. As can be seen, there were no significant sex differences between the high and low achievers of both gr des, but this finding was complicated by significant

TABLE 2

MEAN SCORES ON THE CMAS FOR HIGH AND LOW ACHIEVING BOYS AND GIRLS IN THE FIFTH AND SIXTH GRADES

	Fifth Grade				Sixth Grade			
	Boys		Girls		Boys		Girls	
Group	*N*	*M*	*N*	*M*	*N*	*M*	*N*	*M*
High Achieving	41	17.2	69	22.8	43	15.3	62	14.0
Low Achieving	54	19.8	20	13.7	49	17.2	28	23.4

achievement level and sex × achievement level interaction effects. Between the high and low achieving girls of both grades, the difference was significant at the .001 level. The difference between the high and low achieving boys of each grade did not attain statistical significance, suggesting the greater stability of this measure for boys. These results show that the tendency to score high or low on the anxiety scale is not distributed on the same continuum for fifth and sixth grade girls.

TABLE 3

ANALYSIS OF VARIANCE OF CMAS SCORES

	Fifth Grade		Sixth Grade	
Source	*F*	*p*	*F*	*p*
Sex (S)	3.13	.10	1.32	...
Achievement Level (A)	4.88	.05	23.89	.001
S × A	16.80	.001	14.36	.001

NOTE.—All analyses of variance were corrected for disproportionality by the method suggested by Went, Neidt, and Ahmann (7, p. 211-225). All results reported as significant would have remained so irrespective of the correction factors involved.

DISCUSSION

These findings suggest a cautious use of the CMAS and demonstrate that the practice of obtaining anxiety indices at one grade and using these indices to form high and low anxiety groups from one to several years later is a dubious procedure. In related studies, the authors have discovered similar grade changes with girls at these age levels on the Brown Personality Inventory (2) and a scale measuring impulsivity in children (6).

The reason for these grade changes between girls who differ in achievement level is not at present apparent. However, it is well known that a

marked preadolescent growth spurt occurs in the two years preceding puberty in girls. It is possible that girls, when first experiencing these changes, react with greater than normal sensitivity on the CMAS. MacFarlane has noted a peak in problem behavior for girls in the year preceding the menarche (5). Brown, too, has noted important shifts in female sex role preferences at this time (1). Presumably, the high achieving and likely more mature girl would enter this phase before her low achieving peer. This reasoning would predict a peak difference at the late fifth grade level, when the high achieving girls should be considerably more anxious. By the onset of puberty, the late sixth grade, the high achieving girl should become more stable than her low achieving peer who would be now experiencing the peak of this phase and be significantly more anxious. Since boys do not reach their peak growth spurt until approximately 13 to 14 years, they would not be affected by this developmental phenomenon during grades four, five, and six, and their scores could be expected to remain more stable.

Summary

When the CMAS was administered to fifth and sixth grade children, it was found that there were significant differences on anxiety scores between the grades, but not significant differences between the sexes. This reverses an earlier finding of Castaneda, McCandless, and Palermo (3). Perhaps more important was the discovery that, when the children at different grade levels are clearly differentiated in terms of achievement, the high achieving girls of the fifth grade are significantly more anxious than the low achieving girls of the fifth grade, but in the sixth grade this relation is reversed with the low achieving sixth grade girls being significantly more anxious. The same reversal in anxiety scores was not found for the boys for whom measures of anxiety did not differentiate between the high and low achieving groups. These results indicate the inadvisability of using CMAS measures or those of other personality inventories which are not adequately differentiated in terms of grade, sex, and achievement. It is suggested that these reversals in the girls' scores may be attributed to physical changes which occur in the years immediately prior to menarche.

References

1. Brown, D. G. Masculinity-femininity development in children. *J. consult. Psychol.*, 1957, 21, 197-202.
2. Brown, F. A psychoneurotic inventory for children between nine and fourteen years of age. *J. appl. Psychol.*, 1934, 18, 566-577.
3. Castaneda, A., McCandless, B. R., & Palermo, D. S. The children's form of the manifest anxiety scale. *Child Develpm.*, 1956, 27, 317-326.

4. McCandless, B. R., & Castaneda, A. Anxiety in children, school achievement, and intelligence. *Child Develpm.*, 1956, 27, 379-382.

5. MacFarlane, J. W., Allen, L., & Honzik, M. P. *A developmental study of the behavior problems of normal children between 21 months and 14 years.* Berkeley: Univer. of California Press, 1954.

6. Sutton-Smith, B., & Rosenberg, B. G. A scale to identify impulsive behavior in children. *J. genet. Psychol.*, in press.

7. Went, J. E., Neidt, C. O., & Ahmann, S. J. *Statistical methods in educational and psychological research.* New York: Appleton-Century-Crofts, 1954.

A COMPARISON OF "HIGH CAUSALLY" AND "LOW CAUSALLY" ORIENTED SIXTH GRADE CHILDREN IN RESPECT TO A PERCEPTUAL "INTOLERANCE OF AMBIGUITY TEST" [1,2]

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This paper reports on one of a series of studies concerned with the development of a causal orientation toward one's environment, investigating perceptual variables that are related to a causal approach. A causal orientation to one's social environment involves an understanding and appreciation of the forces that operate in human behavior, their antecedents and their consequences. The basic hypothesis that the Preventive Psychiatry Research Program attempts to investigate is whether a causal approach toward one's environment contributes to mental health (7). This paper reports the findings of a research study which purports to test a limited aspect of this hypothesis.

This study was designed to determine whether children who are high causally oriented toward their environment differ from children who are low causally oriented in responses to a perceptual intolerance of ambiguity scale, the Decision Location Test (DLT).[3]

One aspect of intolerance of ambiguity that is particularly relevant in this study has been defined as "the tendency to . . . arrive at premature closure . . . often at the neglect of reality" (4, p. 115). Intolerance of

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[1] This study is in part based on a paper read at the Biennial Meeting of the Society for Research in Child Development, Bethesda, Md., March 1959.

[2] The project of which this study is a part is being supported by the Grant Foundation.

[3] The Decision Location Test was originally designed by Drs. Etzel and Rosenblum and revised for group presentation by Drs. Etzel, Rosenblum, and Levitt.

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ambiguity tends to precipitate early judgment in perception. One theoretical explanation is that the individual feels insecure if confronted with an ambiguous situation and, consequently, attempts to gain security by structuring the ambiguous situation or stimulus prematurely (6). Furthermore, his need for this structure is so great that he will cling to his perception with a greater degree of certainty; he will feel that his perception is the correct one. "The maintenance of such solutions requires the shutting out of aspects of reality which represent a possible threat to these solutions" (4, p. 115). On the other hand, the individual who is tolerant of ambiguous stimuli and situations might arrive at premature closure, but would do so in probability terms and attach less finality and certainty to his judgment.

Hypotheses

In line with the above discussion it is hypothesized that "High Causally" oriented subjects will be more tolerant toward ambiguous perceptual stimuli than "Low Causally" oriented subjects. The subhypotheses that follow are that the "Highs" will differ from the "Lows" in (a) making fewer "guesses" about the objects in a sequence of incomplete pictures; (b) waiting longer, until the picture is more complete, before they begin to make "guesses"; (c) making the correct response earlier; (d) being more inclined to express a feeling of uncertainty as long as the stimulus is ambiguous. In other words a higher degree of certainty will be expressed later in the "Highs" than in the "Lows."

Procedure

In order to investigate this problem, several tests were administered to 280 students in the sixth grade in the public schools of a midwestern community of 80,000. Of the 280 students who participated in this study, 144 had been exposed to a learning program essentially designed to develop a causal orientation toward one's social environment. This program was conducted as part of the Preventive Psychiatry Research Project and is described elsewhere (7). The remaining 136 subjects, who served as controls for the experimental groups in another research study, had participated in regular classroom learning programs without special emphasis on social causality. Thus, approximately half of the subjects came from a learning environment that was causally oriented, while the other half came from regular classrooms. From the total group of 280 students, a group of "High Causally" and "Low Causally" oriented subjects were selected, regardless of whether an individual had participated in a causally oriented or in a regular classroom program. For the selection of the "High" and "Low" groups, the following tests were administered: (a) the "Social Causal Test" combining the scores from the Elementary Causal Test[4] (reliability = .63), and the Problem Situation Test[4] (reliability = .77); (b) the "Physical

Causal Test,"[4] Parts I and II (reliability = .80). These tests measure the child's ability to apply currently accepted concepts of social and physical causality.

The Social Causal Test for the total group of 260 has a correlation of .08 with IQ ($N = 260$). The Physical Causal Test Score has a correlation of .58 with IQ ($N = 251$). It is this latter fact that might help in explaining that the "High Group" is significantly different in IQ scores from the "Low Group." However, this fact does not invalidate the data of this study, since it will be shown that the criterion variables are relatively unrelated to IQ.

The "High Group" for the purpose of this study was defined as all those subjects who fell above the group mean on *both* selection criteria, the combined Social Causal Test and the Physical Causal Test, and will be referred to as the "Highs." The "Low Group," on the other hand, was defined as all those individuals who fell below the group mean on *both* of the above described selection criteria and will be referred to as the "Lows." Of the 280 subjects, 168 met these selection criteria.

To test the hypotheses stated previously, a perceptual intolerance of ambiguity test, a revised form of the DLT, was administered to all subjects. This test includes four subtests each of which consists of 15 slides. The first slide in each subtest is just a minute fragment of an object. In each consecutive slide something is added to the picture so that the object is completed or nearly completed on the 15th slide. The final object in each of the four subtests was highly familiar to all subjects: car, shoe, cat, and the figure "5." A sample of the answer sheet is reproduced below. The instructions were adopted with modifications from Etzel and Levitt (3, 6). The reliability of the DLT is difficult to determine; correlations of .66 (6) and .59 (14) have been reported.

From the subjects' answer sheets several scores can be obtained that are relevant to the above hypotheses and thus give insight into the stated problem. (a) Scored are the "*number of guesses*" other than "don't know" prior to the point of correct perception. (b) Scored is the slide number at which the "*earliest guess*" other than "don't know" occurs. (c) Scored is the slide number at which the *earliest correct response* occurred. Correct response is defined as the unbroken succession of correct responses ranging from some earlier slide to the final slide. (d) The certainty score for each of the four degrees of certainty is the average slide number at which the earliest response other than "don't know" is made. Thus, if a subject checked "not very sure" for the first time at the fifth slide and gave a response

[4] The Problem Situation Test and the Elementary Causal Test were developed by the staff of the Preventive Psychiatry Research Project and have been reported in the literature (9, 12). Part I of the Physical Causal Test was developed by the author, and Part II was adopted by the author from Clark (2) and revised for use in sixth grade classes. Copies of these tests are available upon request from the Preventive Psychiatry Research Project.

SAMPLE ANSWER SHEET FOR THE DECISION LOCATION TEST

Name _____ Grade _____ Test I, II, III, IV

	How sure are you about it?				
What do you think the object will be?	*very sure*	*fairly sure*	*about 50/50*	*not very sure*	*just a hunch, a little bit better than a guess*
1. _____	A_____	B_____	C_____	D_____	E_____
2. _____	A_____	B_____	C_____	D_____	E_____
3. _____	A_____	B_____	C_____	D_____	E_____
. . . . .					
15. _____	A_____	B_____	C_____	D_____	E_____

other than "don't know," his certainty score for "not very sure" is 5. Both guesses and correct responses are scored for the certainty score, since a large proportion of the subjects did not check "fairly sure" and "very sure" until correct perception occurred. Not all children obtained scores on the certainty criterion, since a given subject was at liberty to check as many or as few different degrees of certainty as he wanted.

RESULTS

One question that arises is how many of the Highs or Lows came from the causal and how many from the regular classrooms? Also, to what extent did sex enter as a variable? In order to answer this question a 2 by 2 by 2 chi square test for interaction between sex and the criteria under investigation was made according to Snedecor (15). The following results were obtained (*see* Table 1): (a) first order interaction test between sex and the two groups for the "regular" subjects, chi square 1.18, not significant; (b) first order interaction between sex and the two groups for

TABLE 1

INTERACTION BETWEEN SEX AND THE CRITERIA UNDER INVESTIGATION

	CAUSAL		REGULAR		
	Boys	*Girls*	*Boys*	*Girls*	*Total*
High Group	33	28	15	17	93
Low Group	12	11	32	20	75
Total	45	39	47	37	168

TABLE 2

A COMPARISON OF SUBJECTS FROM "CAUSAL" AND "REGULAR" CLASSROOMS WITH RESPECT TO THE SELECTION VARIABLE

	Causal	*Regular*	*Total*	*Chi Square*	*p*
High Group ...	61 (46.5)*	32 (46.5)	93		
Low Group ...	23 (37.5)	52 (37.5)	75		
Total	84	84	168	18.88†	< .001

* Figures in parentheses are expected frequencies.
† Chi square with Yates correction for continuity.

"causal" subjects, chi square .16, not significant; (c) test for second order interaction, chi square 1.96, not significant.

Since there is no significant interaction between sex and the criteria under investigation, the data may be combined into a fourfold table of the following dimensions: High/Low groups and Causal/Regular groups. A regular chi square analysis of these data results in a $\chi^2 = 18.884$ which is significant at the .001 level (Table 2). The causal classes contribute twice as many subjects to the High Causal cell, while the regular classes contribute twice as many to the Low Regular cell. This shows that a learning program designed to develop an understanding of cause-effect relationship does produce significantly more causally oriented subjects than a regular learning program as measured by the above described paper and pencil tests.

TABLE 3

ANALYSIS OF VARIANCE OF BETWEEN GROUP AND BETWEEN SUBTEST DIFFERENCES ON "NUMBER OF GUESSES"
(Lindquist, Type I Design)

Source	*df*	*Sum of Squares*	*Mean Square*	*F*
Between Subjects	159	5369.02		
Groups	1	155.22	155.22	4.70*
error (b)	158	5213.80	33.00	
Within Subjects	480	3714.25		
Subtests	3	384.14	128.05	18.28†
Groups × Subtests	3	10.35	3.45	.49
error (w)	474	3319.75	7.00	
Total	639	9083.27		

* $p < .05$.
† $p < .01$.

In order to test the first subhypothesis, namely that the Highs will make fewer guesses than the Lows, an *F* test between the two groups and the four subtests was computed (8). The analysis of variance is reported in Table 3. The *F* ratio between the two groups is 4.70 which is significant at the .05 level. Thus, our data support the hypothesis that high causally and low causally oriented subjects differ in respect to the number of guesses they make on the Decision Location Test. In other words, the data show that the Highs make fewer guesses than the Lows on a perceptual intolerance of ambiguity test. The *F* ratio between subtests is 18.28 which is significant at the .01 level. This difference might partly be explained by the moderately high reliability of the subtests, partly by the fact that the subjects of both groups show from subtest to subtest a decreasing tendency to guess. The interaction between groups and subtests is not significant. Since the between group *F* ratio is significant at the .05 level and the between subtest *F* ratio is significant at the .01 level, the difference between the two groups for each of the four subtests was computed by *t* test. The results are reported in Table 4. All differences are in the predicted direction.

TABLE 4

COMPARISON OF MEAN NUMBER OF "GUESSES" OF HIGH AND LOW GROUPS ON THE DECISION LOCATION TEST

	High Group			Low Group			
	N	*M*	*SD*	*N*	*M*	*SD*	*t*
1—car	89	5.4	3.5	71	6.2	4.1	1.23
2—shoe	89	3.7	3.0	71	5.1	4.2	2.35*
3—kitten	89	4.3	3.4	71	5.3	4.2	1.66
4—figure 5	89	3.3	3.4	71	4.0	3.4	1.43
Total	89	16.6	10.3	71	20.6	12.7	2.12*

* $p < .05$.

The difference is significant at the .05 level for subtest 2 and is significant at the .05 level for the total score. The correlation between "number of guesses" and IQ is $-.04$ ($N = 246$). Since this correlation is not significant, we may conclude that it is not the difference in IQ that accounts for the fact that the Highs make significantly fewer guesses than the Lows.

The same statistical design was used in order to test the second subhypothesis, namely that the Highs will guess later than the Lows. The difficulty in this analysis is the fact that not all subjects guess. Since the slide number of the earliest guess is used as the score, subjects who did not guess had to be excluded. Not guessing occurred about equally often for both groups, 50 times or 14 per cent of the time in the Highs and 43 times or 15 per cent of the time in the Lows. Since individual scores

TABLE 5

ANALYSIS OF VARIANCE OF BETWEEN GROUP AND BETWEEN SUBTEST DIFFERENCES ON "EARLIEST GUESS"
(Lindquist, Type I Design)

Source	*df*	*Sum of Squares*	*Mean Square*	*F*
Between Subjects	107	2328.25		
Groups	1	81.86	81.86	3.86*
error (b)	106	2246.38	21.19	
Within Subjects	324	2814.25		
Subtests	3	80.47	26.82	3.13†
Groups × Subtests	3	11.20	3.73	.44
error (w)	318	2722.58	8.56	
Total	431	5142.50		

* $p > .05, < .10$.
† $p < .05$.

entered for each of the four subtests in an analysis of variance have to be from the same persons, any subject had to be excluded who did not guess on one or more of the four subtests. In selecting only those subjects who guessed on all four subtests, the original N of 89 in the high group was reduced to 60 or 67.4 per cent; and the original N of 71 in the low group was reduced to 48 or 67.6 per cent. The analysis of variance between the remaining 60 High and 48 Low subjects is reported in Table 5. The F ratio between the two groups is 3.86 which approaches the .05 level of significance. (For $N = 100$ the F ratio has to be 3.94 to be significant at the .05 level.)

TABLE 6

COMPARISON OF THE MEAN OF THE "EARLIEST GUESS" OTHER THAN "DON'T KNOW" OF HIGH AND LOW GROUPS ON THE DECISION LOCATION TEST

	High Group			Low Group			
Test	*N*	*M*	*SD*	*N*	*M*	*SD*	*t*
1—car	84	3.8	3.1	66	3.4	3.1	.77
2—shoe	78	4.6	3.8	58	3.3	3.6	2.09*
3—kitten	75	5.1	4.6	61	4.6	4.3	.73
4—figure 5	69	5.0	3.7	56	3.7	2.7	2.35*

* $p < .05$.

Since the N had to be reduced by approximately one third in order to make the F test possible and since the between group F ratio with the reduced N approaches the .05 level, the difference between the two groups for each of the four subtests was computed by t test. The results are reported in Table 6. All differences between the Highs and the Lows are in the predicted direction. The differences are significant at the .05 level of confidence for subtests 2 and 4. The data, even if the above discussed limitations are taken into consideration, give tentative support to the hypothesis that Highs begin to guess later if confronted with ambiguous stimuli than Lows. The correlation between the average of the earliest guess and IQ is $-.04$ ($N = 240$), not significant, indicating that differences in IQ do not account for the obtained differences. The between subtest F ratio of 3.13 is significant at the .05 level, since there is a systematic trend to begin to guess later from the first to the fourth subtest. The interaction between groups and subtests is not significant.

In analyzing the data for the third subhypothesis, namely that the Highs will make a correct response earlier than the Lows, the same statistical design was utilized. The analysis of variance is reported in Table 7.

TABLE 7

ANALYSIS OF VARIANCE OF BETWEEN GROUP AND BETWEEN SUBTEST DIFFERENCES ON EARLIEST CORRECT RESPONSE
(Lindquist, Type I Design)

Source	*df*	*Sum of Squares*	*Mean Square*	*F*
Between Subjects	159	308.21		
Groups	1	3.28	3.28	1.70
error (b)	158	304.93	1.93	
Within Subjects	480	1094.25		
Subtests	3	391.27	130.42	88.42*
Groups × Subtests	3	3.84	1.28	.87
error (w)	474	699.14	1.47	
Total	639	1402.46		

* $p < .01$.

The F ratio between the two groups is 1.70 which is not significant. Thus, we must reject the hypothesis that Highs and Lows differ in their mean correct response score to the DLT. Correlation between the earliest correct response on the DLT and IQ is $-.13$, which is small in actual size but statistically significant at the .05 level. Thus, there is a tendency for the more intelligent subjects to give the correct response earlier than the less intelligent.

The between subtest F ratio is 88.42 which is highly significant. This is partly due to the fact that correct perception rarely occurs on subtest 1. For tests 1 and 2 the 15th slide was not completed so that a score of 16 was possible. Thus, there are large differences between the means of both groups on subtests 1 and 3, and 1 and 4, which partly explain the large between subtest F ratio. The interaction effect between subtest and groups is not significant.

The original form of the DLT did not allow the subjects to indicate the degree of certainty that they felt in giving a response to an incomplete picture. An early incorrect response could have two different meanings: it could be a rather rigid "this is the answer to the problem" kind of response, or it could be "I have just a hunch, but I am quite willing to change" kind of response. The latter type of reasoning, namely thinking in probability terms and remaining flexible if confronted with new evidence, would not mean the same thing as a rigid response. Consequently, in considering the DLT for this particular research project, the question was raised: How then can a rigid response—which is indicative of intolerance of ambiguity—be distinguished from a rather early advancement of hunches, which indicate flexibility and which therefore can not be considered as indicative of intolerance of ambiguity? In line with the above discussion it was hypothesized that the Highs would differ from the Lows in that the former would be less certain on those slides on which the final object can not yet be recognized and would therefore express certainty later than the Lows. To test this hypothesis, subjects were asked to check on a scale of five degrees of certainty how sure they felt about each response.

Table 8 presents the "average certainty score" for four degrees of certainty, comparing the certainty score for Highs and Lows. For all four certainty scores, we can accept the hypothesis that Highs and Lows differ with respect to the degree of certainty expressed to the ambiguous stimuli.

TABLE 8

COMPARISON OF THE MEAN "CERTAINTY SCORE" FOR FOUR DEGREES OF CERTAINTY OF HIGH AND LOW GROUPS ON THE DECISION LOCATION TEST

	High Group			Low Group			
Certainty Score	*N*	*M*	*SD*	*N*	*M*	*SD*	*t*
not very sure	80	7.2	3.8	56	5.5	2.9	2.99†
about 50/50	73	8.8	3.7	57	7.2	3.6	2.52*
fairly sure	74	11.6	2.8	54	10.1	3.9	2.57†
very sure	84	13.6	1.7	70	12.0	3.7	3.39†

* $p < .05$.
† $p < .01$.

Highs advance their guesses as hypotheses, while Lows express certainty about their guesses.

The correlations between the four average certainty scores and IQ are: (a) for "not very sure" $r = .02$, not significant ($N = 126$); (b) for "about 50/50" $r = .07$, not significant ($N = 121$); (c) for "fairly sure" $r = .23$, significant at the .05 level ($N = 119$); (d) for "very sure" $r = .22$, significant at the .01 level ($N = 143$). The actual size of the correlation is small in all instances. It can be said that there is a tendency for more intelligent children to use the concepts of certainty "fairly sure" and "very sure" later than less intelligent children.

It is important to note that on an average the Highs give the certainty score "very sure" for the first time to slide number 13.6. Their average correct response is 14.2, the discrepancy being only .6 slides. The Lows, on the other hand, give the certainty score of "very sure" on an average for the first time to slide number 12.0, while their average correct response is 14.3, this discrepancy being 2.3 slides, or four times as large as that of the Highs.

Since the analysis in Table 8 is based only on the first time any of the degrees of certainty is checked, many data are lost. For a more general demonstration of the same condition which includes all scorable responses we decided to picture graphically the difference between the various certainty scores for the two groups. Figures 1 to 6 present the percentages of each of the certainty responses for all 15 slides for both the High Group

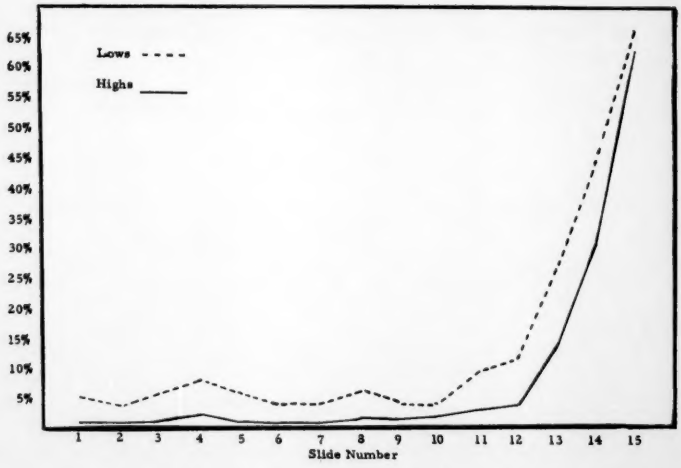

FIGURE 1—A comparison of percentages of "Very Sure" responses of High and Low groups for each of the 15 slides on the Decision Location Test.

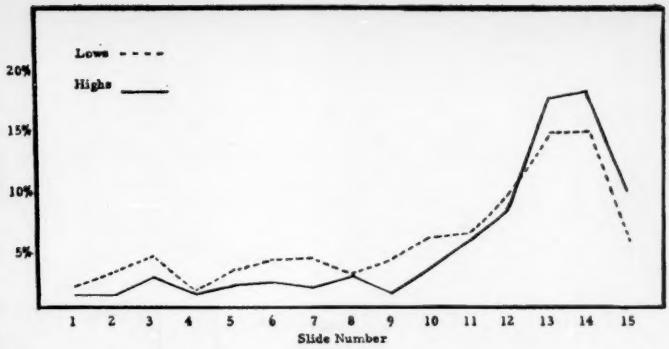

FIGURE 2—A comparison of percentages of "Fairly Sure" responses of High and Low groups for each of the 15 slides on the Decision Location Test.

(solid line) and the Low Group (dotted line). The abscissa in each of the tables represents the 15 slides in the sequence in which the test was administered. On the ordinate the percentage of the average certainty score, rather than the score itself, is entered in order to make the two curves comparable.

Figure 1, picturing the "very sure" responses, demonstrates that it is for all slides that the Lows make more "very sure" responses than the

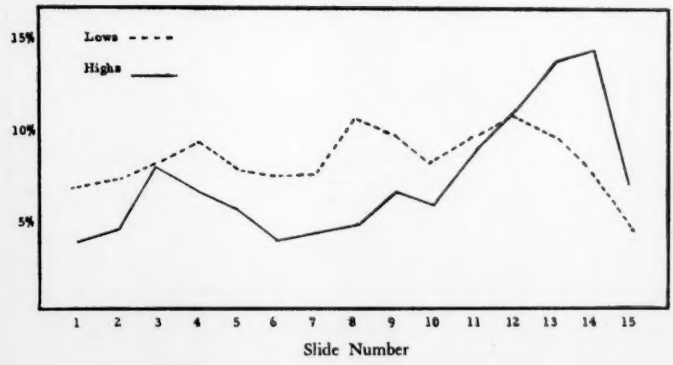

FIGURE 3—A comparison of percentages of "About 50/50" responses of High and Low groups for each of the 15 slides on the Decision Location Test.

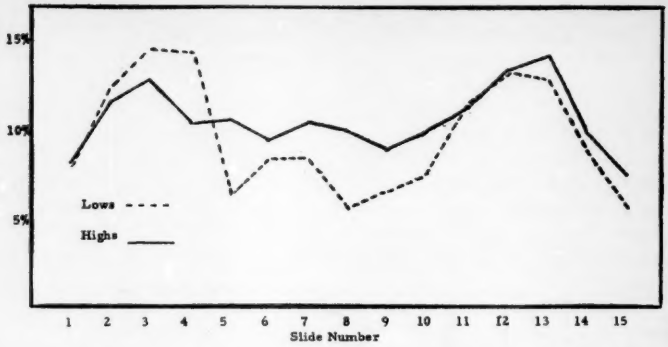

FIGURE 4—A comparison of percentages of "Not Very Sure" responses of High and Low groups for each of the 15 slides on the Decision Location Test.

Highs; this difference is most pronounced for the earlier slides and merges at the 15th slide, when the stimulus has lost its ambiguous quality.

In Figure 2, picturing the "fairly sure" responses, the differences are not as great as those shown in Figure 1. However, the trend is the same, except that the Highs from slide 13 on make more use of the "fairly sure" category than the Lows. This is the point at which the final object becomes

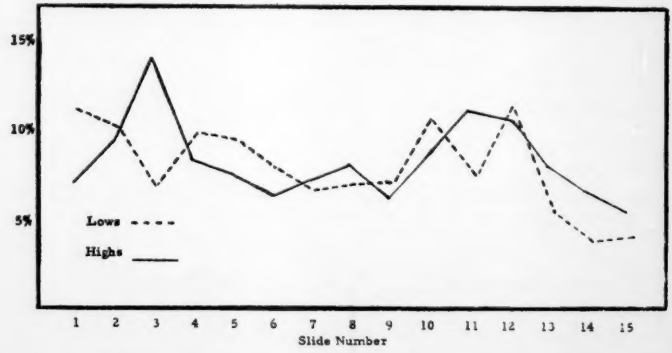

FIGURE 5—A comparison of percentages of "Just a Hunch" responses of High and Low groups for each of the 15 slides on the Decision Location Test.

recognizable. The mean correct perception for all four slides for both groups occurred at approximately the 14th slide.

Figure 3, picturing the "about 50/50" response, follows the same trend. The Highs curve crosses the Lows curve between the 11th and 12th slide, one slide earlier than in Figure 2.

Figure 4, "not very sure," and Figure 5, "just a hunch," show no consistent trend that differentiates the two groups. However, if compared with Figures 1 and 6, they show that, as the certainty score changes from certainty (very sure) to probability (just a hunch), the Highs make increasing use of the certainty categories that express the tentative nature of the response. Figure 4 and to some extent Figure 5 indicate that the Highs make as much, if not more use of these probabalistic responses than the Lows.

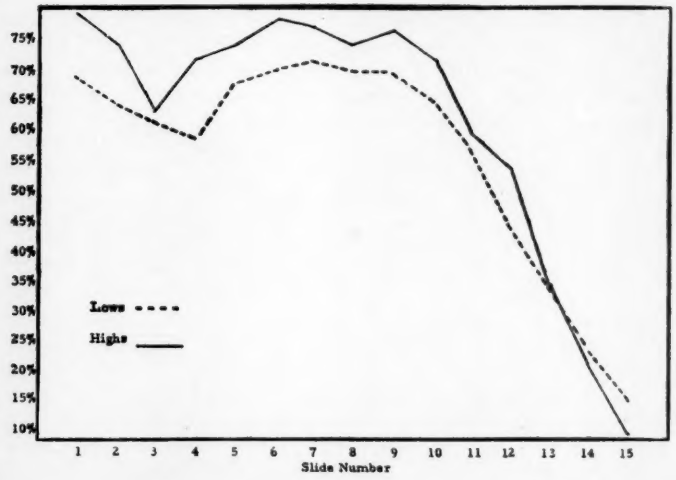

FIGURE 6—A comparison of percentages of "Don't Know" responses of High and Low groups for each of the 15 slides on the Decision Location Test.

This trend is completed in Figure 6, picturing the "don't know" responses. The Highs make more use of the response "don't know" than the Lows. This is in line with the theory which says that subjects who are intolerant of ambiguous stimuli have a need for premature closure. Interestingly, when the stimulus is no longer ambiguous, at slides 13 to 15, the Highs give fewer "don't know" responses than the Lows.

Summary and Conclusions

The data support the hypothesis that high causally oriented children are more tolerant of such perceptual ambiguous stimuli as are presented in the Decision Location Test and have less of a tendency to arrive at premature closure than the low causally oriented subjects. Exposed to a sequence of ambiguous pictures, the Highs make fewer guesses. This difference is significant at the .05 level. They also begin to guess later than low causally oriented subjects. The F ratio with a reduced N approaches the .05 level of significance. When the high causally oriented subjects make guesses about an ambiguous stimulus, these guesses are more in the nature of hunches or hypotheses, while for the low causally oriented subjects such guesses are more rigid and judgmental. These differences are significant at the .01 level for three of the four average certainty scores and at the .05 level for the remaining average certainty score.

Of the three methods used for scoring the subjects' answers to the question, "What do you think the object will be?" the "number of guesses" appears to be most useful as an indicator of intolerance of ambiguity since it allows the responses of all subjects to be scored and since it measures the behavior of the subjects during the total sequence of slides. However, there is evidence that the certainty score makes finer differentiations that have to be considered. The data suggest that the concept "intolerance of ambiguity" be refined by distinguishing between the kind of premature closure which is rigid, judgmental, final, and in line with the previously discussed meaning of the concept "intolerance of ambiguity" and the kind of early closure which is flexible and might be considered as thinking in probability terms rather than as "intolerance of ambiguity." A further study (10) gives evidence that the same High and Low subjects also differ significantly in the predicted direction on a verbal intolerance of ambiguity scale.

Thinking in probability terms or tolerance toward an ambiguous stimulus might be considered as an indicator of mental health since the individual appears to be more realistic in his evaluation of the world around him, more aware of his own limitations, and more willing to admit that he does not know the answer to a problem. Intolerance of ambiguity, on the other hand, indicates a need to structure the world even at the expense of neglecting reality. These conclusions are indirectly supported by other research studies on intolerance of ambiguity. Smock (13) showed that psychological stress tended to increase intolerance of ambiguity. Block and Block (1) demonstrated that intolerance of ambiguity and ethnocentrism were intrinsically related. O'Connor (11) reported a correlation of .55 between ethnocentrism and a different measure of intolerance of ambiguity. In this study the number of guesses (first way of scoring) correlate .22, significant at the .01 level, with the Children's Antidemocratic Attitude Scale (CADS) (5). Levitt (6) reports a correlation of .39 ($N = 47$) be-

tween CADS and DLT. Furthermore, he shows that a subject who is intolerant of ambiguity tends to believe popular misconceptions and superstitions.

References

1. Block, J., & Block, Jeanne. An investigation of the relationship between intolerance of ambiguity and ethnocentrism. *J. Pers.*, 1951, 19, 303-311.
2. Clark, C. A. A study of the adolescent's conception of the nature of scientific knowledge. Unpublished doctoral dissertation, State Univer. of Iowa, 1954.
3. Etzel, Barbara C. A study of the effects of frustration upon the preference for doing a subsequent task. Unpublished doctoral dissertation, State Univer. of Iowa, 1953.
4. Frenkel-Brunswik, Else. Intolerance of ambiguity as an emotional and perceptual personality variable. *J. Pers.*, 1949, 18, 108-143.
5. Gough, H. G., Harris, D. B., Martin, W. E., & Edwards, Marcia. Children's ethnic attitudes: I. Relationship to certain personality factors. *Child Develpm.*, 1950, 20, 83-91.
6. Levitt, E. E. Studies in intolerance of ambiguity: I. The decision location test with grade school children. *Child Develpm.*, 1953, 24, 263-268.
7. Levitt, E. E., & Ojemann, R. H. The aims of preventive psychiatry and "causality" as a personality pattern. *J. Psychol.*, 1953, 36, 393-400.
8. Lindquist, E. F. *Design and analysis of experiments in psychology and education*. Cambridge, Mass.: Riverside Press, 1953.
9. Lyle, W. H., Jr. & Levitt, E. E. Punitiveness, authoritarianism, and and parental discipline of grade school children. *J. abnorm. soc. Psychol.*, 1955, 51, 42-46.
10. Muuss, R. E. A comparison of "high causally" and "low causally" oriented sixth grade children on personality variables indicative of mental health. Paper read at the Iowa Academy of Science, Mt. Pleasant, Iowa, April 1959.
11. O'Connor, Patricia. Ethnocentrism, "intolerance of ambiguity," and abstract reasoning ability. *J. abnorm. soc. Psychol.*, 1952, 47, 526-530.
12. Ojemann, R. H., Levitt, E. E., Lyle, W. H., & Whiteside, Maxine F. The effects of a "causal" teacher training program and certain curricular changes on grade school children. *J. exp. Educ.*, 1955, 24, 95-114.

13. SMOCK, C. D. The influence of psychological stress on the "intolerance of ambiguity." *J. abnorm. soc. Psychol.*, 1955, 50, 177-182.

14. SMOCK, C. D. The relationship between "intolerance of ambiguity," generalization and speed of perceptual closure. *Child Develpm.*, 1957, 28, 27-36.

15. SNEDECOR, W. *Statistical methods.* Ames: Iowa State Coll. Press, 1946.

TRANSFER EFFECTS OF LEARNING A VERBAL GENERALIZATION[1]

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In educational practice, curriculum planning assumes that there will be a saving in the learning of related material. But the content of the learning to be transferred is seldom considered specifically enough for precision in planning. Further, most laboratory experiments use shorter time intervals between the training and transfer situations, and more similarity between the situations, than is the usual case in natural situations.

The term transfer has been applied to any learning experiment in which training and test conditions are not identical (11, 17) and where there has been concern with generalization, rather than with manipulating strength or frequency alone. This indicates one reason for slow progress in such research; it has been concerned with the dimension of similarity, which is more difficult to quantify than strength or frequency of response. In most applied research, complex stimuli and responses are used, which present maximum difficulties in advance specification of similarity quantitatively. These hurdles appear in studies in which the common feature in training and test is complex visual-motor coordination (3), verbal training on nonsense syllables (13, 16, 18), or stimulus pre-differentiation (1, 4, 5, 6, 7, 14).

The study of verbal or motor mediation (9) has overtly certain similarities to transfer research. Characteristically, responses come to be elicited by new stimuli just as in transfer research. But the new stimuli are not similar to the old; they are linked to old responses by training. In the classic mediation models one can specify quantitatively the probabilities that each link in the mediation series will elicit the next because training

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has been controlled. One assumes that overt response probabilities also hold for implicit mediating responses. For certain types of materials this assumption is clearly fallacious—e.g., taboo words (8, 10); but the assumption applied to other verbal material has been reasonably well supported (2, 12, 15).

Design in mediation studies may follow one of a variety of patterns. Only two will be discussed below. In these descriptions S represents some stimulus—a light, a complex visual pattern, a color, a sound. R represents a response—a word to be said, pushing a lever. V represents a stimulus which can be presented either by another person or by the subject as a self-stimulating response. Verbal responses are ideal in this role. The two patterns follow:

1.

$S \rightarrow V$
$V \rightarrow R$
Test:
$S \rightarrow (V) \rightarrow R$

2.

$V \rightarrow R$
$S \rightarrow V$
$\searrow \downarrow$
(R)
Test:
$S \rightarrow (V)$
$\searrow \downarrow$
R

The parenthetical responses are not overt. V, it will be noted, functions both as stimulus and as response. When it occurs as a response, it has, like all responses, self-stimulating properties. The increase in S-R occurrences after training is attributed to implicit V responses during the test. In the second paradigm, training could also occur due to implicit R responses during learning. The second paradigm is often used for word associative material, in which the training in $V \rightarrow R$ is prior to the experiment and is measured by response frequencies in the word association test, and both V and R are verbal.

The common feature of all mediation experiments is that transfer will not occur unless the implicit response occurs. One must know its probability in order to predict the result.

This point is very important in applied situations, where verbal mediation is often used to produce transfer. Suppose, for example, the observable outcome of training in a certain school subject is not verbal, but consists in drawing, action, or symbol manipulation as in the case of natural sciences or mathematics. Frequently, verbal mediation is assumed to be present, and teaching is aimed at altering interverbal probabilities. To simplify in the extreme, let us represent some stimulus pattern as S, the name elicited by it as N, a proposition about it or verbal response as P, and an action

elicited by this proposition or verbal response as R. For instance: S, blinking light on traffic signal; N, "blinking light"; P, "slow down at a blinking light"; R, slowing down.

Verbal training is characterized by manipulating the relationship of N and P. Children are taught verbal rules, descriptions of operations, reading about science. Drivers are given verbal instructions or booklets containing traffic regulations.

Under such a regime transfer to the S-R situation will occur only under the following conditions:

a. The stimulus actually elicits verbal mediating responses. The driver who has never before encountered blinking lights and has only been told to stop at them will not stop unless blinking lights elicit a verbal mediator. In children, with less verbal training than adults, the probability of verbal mediation may generally be less.

b. The implications for action are clear. That is, there is a strong likelihood that the verbal formulation here called P will elicit response R. In the case of a verbal formula "slow down" the probability of slowing a car down is high in a person who knows how to drive. But frequently rules characterize a situation without specifying appropriate responses for the actor. Then the uncertainty of his response is increased by uncertainty in any of the factors that enter into the link. One could test the probability of R, given P, by giving a person overtly the verbal formulation believed to occur mediately.

c. The skills required in performing R are fully available. Where P refers to a perceptual-motor act, improved performance of R rests both on increasing the probability of P and on the skill of the subject in performing R.

The above description is a fragmented one which suggests a sequence. While analytically a sequential description is the most useful, it is quite likely that these processes occur with near-simultaneity if they are well learned. To argue from a phenomenological standpoint that we are not aware of implicit language is an inadequate objection, just as an observation that we are unaware of the kinesthetic sensations in typewriting or piano-playing. Probably these near-simultaneous processes occur so fast they are experienced as insight, and once they have occurred in a given set of circumstances successfully the probability of their reoccurrence and of a short-circuiting of the mediating process will be higher.

In the following experiment two variables are distinguished: trained verbal mediation, in contrast to mediation training without a trained verbal response; the other is the difference in response probabilities of verbal responses and nonverbal responses in the test situation—that is, the predicted increase in R after training is made both for motor performance and verbal. Both the verbal and the nonverbal training situations in addition relied on generalization since the training and transfer tasks were similar but not identical. The following hypotheses are tested:

a. There will be an increment to performance resulting from trained verbal mediation, beyond that gained from relevant nonverbal training only. This training consists both of label training (S → N) and of inter-verbal "rule" training (N → P).

b. There will be a greater effect on verbal than on nonverbal performance as a result of trained verbal mediation. This is particularly likely to be true when the implications of the rule for action are not specified and there has been no special training to guarantee that the verbalization will generate changed nonverbal responses with high probability.

c. Those who show improved verbal performance will more often show better motor performance. If verbal responses be considered evidence that verbal mediation must have occurred, at least the necessary, but not the sufficient conditions for improved motor performance may be present.

d. Among those not given explicit verbal training, spontaneous verbal comments like those offered in the training will lead to an increment in nonverbal and verbal performance in the transfer task.

Method

Subjects

The subjects were 48 third- and fourth-grade children ranging in age from 8-1 to 10-1. The mean age of the girls was 9-3 and of the boys was 9-1.5. The groups were originally selected on the basis of a Gates Reading Test IQ so that half of the children were above 120 in IQ and half below in each subgroup. The subjects were divided into three groups matched on age, sex, grade, and IQ, which were the three experimental groups.

Subsequently, after the experiment was completed, it was decided that we wished to differentiate mental abilities, and three subtests of the Primary Mental Abilities Test were administered. It then appeared that the nonverbal group in the third grade was significantly inferior in form reasoning to the other two groups and that in the fourth grade the control group was superior to the other two groups on form reasoning. In the third grade the verbal group was superior to the nonverbal in verbal ability, and in the fourth grade the control group was superior to the verbal group in verbal ability.

Equipment

The training apparatus consisted of a large plywood board surrounded on four sides by strips of molding and marked with a grid pattern. On one of the long sides a 2-inch thick plank 2 feet in length, with a rubber padding on its vertical surface, was rotated on a bolt at one end and set so that its vertical edge was 4 inches from the edge of the plywood. This was called the backboard. It had slotted arcs protruding at the back with wing bolts, so that it could be swung out at various angles from the back molding and clamped in place. Its full rotation was about 45°.

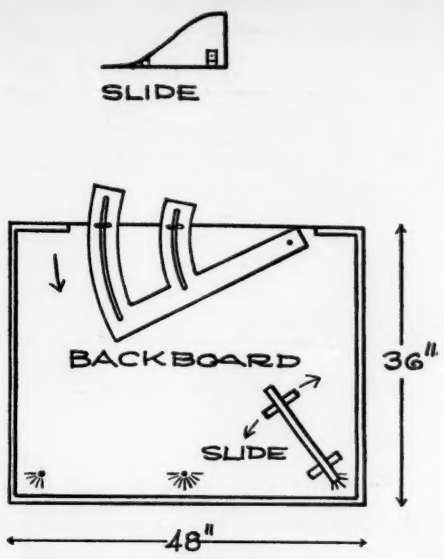

FIGURE 1—Training apparatus.

On the opposite, long, side of the plywood surface was inserted a small slide like a miniature child's slide, with a maximum height of 6 inches. This slide was inserted on a pivot into holes placed in the board at the center and at each corner. In the corners it could be rotated 90° and in the middle, 180°.

A target ball was placed somewhere on the plywood surface in a position indicated by the grid markings. A small wooden ball could be rolled down the slide and, if the slide was aimed toward the backboard, the ball would ricochet.

The test apparatus consisted of a mirror in a position analogous to the backboard, but the whole structure was placed on a vertical dimension so that the "ground" or plywood board was vertical and protruding from it horizontally was a mirror. This was set in a cradle that could be rotated in an axis perpendicular to the board like the training backboard, and in addition the pivots on the mirror permitted rotation in an axis parallel to the board. A flashlight was set so that it was aimed up toward the mirror, but it could pivot out, away from or toward the board on an axis parallel to the board, or it could rotate on an axis perpendicular to the board as did the slide in the training apparatus. The board was covered with tin sheeting and a thin crinoline, and painted black. The target was a card with a cross, fixed to a magnet.

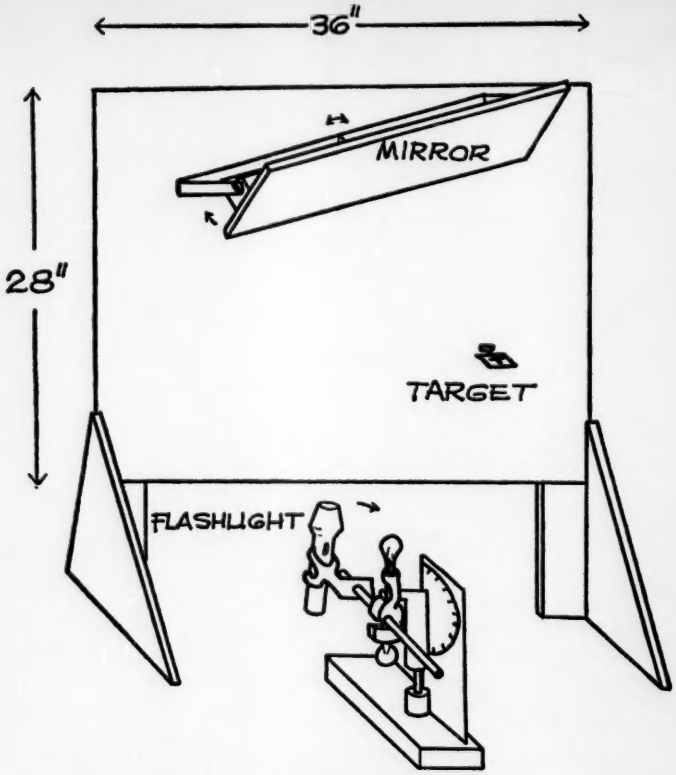

FIGURE 2—Test apparatus.

This target thus stood out on a horizontal plane from the vertical backboard. When the mirror was properly adjusted and the flashlight was aimed up toward it, the reflected light would fall on the red cross of reflector tape. When the flashlight was set directly under the board and pointed up, the path of light was visible along the uneven surface of the cloth up to the mirror and down again. This visible path was analogous to the visible path of the ball traced with flour during the slide procedure.

Procedure

The children were brought individually from the classroom to the experimental room in the school. For *training series A* they were shown the slide apparatus with backboard set parallel to the back molding and with

the slide in center position. Instructions were given in the full 180° rotation of the slide and in proper handling for steadiness while the ball was being released. Four or five practice shots were allowed. The children were then told: "This is how the game works. I will put the target on the board. Then you have two tries to aim the slide so that the ball bounces back and hits the target. After two tries I will move the target and you get two more tries in the new place. I am going to keep a record of every time you hit the target and see how many prizes you get at the end."

Trials were continued to a criterion of five consecutive correct shots including no more than two near-misses, to allow for some error in the uneven bouncing of the ball. The target ball was placed in a series of positions on the board.

Mediation training was introduced, with two operations alike for the verbal and nonverbal training groups. First, the children were asked to draw the expected path of the ball on a piece of black construction paper placed in front of the backboard flat on the floor of the apparatus. During this procedure the slide was in the front left corner position, and the procedure was repeated three times with three different rebound angles. Each time after the path was drawn the ball was coated with flour and rolled down the slide. The flour traced a path on the paper.

After the first stage of mediation training the ***nonverbal*** group was told: "Now let's look at the pictures. I'm going to color them in, and then you look at them closely, so that you can learn to draw the way the ball goes." The experimenter then drew a line on each side of the point of contact, perpendicular to the backboard line, so that there were two congruent triangles formed by the angles of incidence and rebound.

The ***verbal*** group performed the same operation, but was told: "When a line turns like this it is called an angle. Here is the line of the backboard. Can you see three angles here? The backboard makes an angle here and here, and there is an angle in between. I am going to color in the side angles. Which angle looks more like this one? (Shows one of the six side angles in the three drawings) Like this one? (Shows another) So the two side angles made by the path the ball follows are always alike. They are equal. Whenever a ball bounces, the side angles it makes are alike."

In the second stage of mediation training the children were shown a series of mimeographed drawings of a horizontal line, representing the backboard, with a line projecting from it representing the oncoming ball. The children were asked where they thought the ball would go and drew the path. In the ***nonverbal*** group the child was asked: "Does your picture look like the pictures the ball made?" and, when he erred, was asked to fix the drawing so it would look like the picture the ball made. If he was wrong, the experimenter colored in the side triangles as before. The child continued to draw lines and correct them until he had drawn three consecutive correct ones. He was then told that if he remembered the pictures he would be able to do very well at the game.

The *verbal* group also was asked to draw pictures, but after each drawing he was asked if he had drawn the picture so that the two side angles were alike. At the end he was told: "When a ball bounces, it makes a path. Could you tell me what you learned about the two side angles it makes? The side angles made by the path are alike. If you think about that you will be able to do very well at this game."

Training series B required aiming of the slide from a position on the right of the board. The target ball occupied a fixed position but the backboard was pivoted into various positions. The criterion was the same as in series A. The nonverbal group was reminded to think about the pictures they drew, and the verbal group was asked to think about the rule about the path of the ball and was asked about it every five trials. For *training series C* the child set the backboard after the experimenter had moved the slide in rotation as in series B. At the end, each child was asked, "Could you tell me how you would describe the way you tried to make the ball go? Did you try to picture it to yourself at all? Did you imagine the path of the ball? Tell me if you can the rule that describes how the ball goes."

The *control* group never saw the slide apparatus. They were given training by the same experimenter on a completely unrelated task.

There were two test series with the mirror, approximately six weeks later. In *test series A* the child was asked to predict where a spot of light would appear when the flashlight pointed at the mirror was turned on. A series of 10 settings alternatively changed the tilt of the flashlight towards or away from the board, the tilt of the mirror to right or left, and the tilt of the mirror down or up towards the viewer in front of the apparatus. The spot might be cast as far as eight feet from the apparatus when the mirror and the flashlight both tilted out from the board. After the series, the child was asked: "If you had to explain to one of your friends how to tell where the spot was going to be, how would you explain? How did you usually decide where the spot would be? Did you picture anything, or did you have a rule about it?" The responses were tape recorded.

In *test series B* the target card was moved about the board, or the mirror was rotated to right or left, and the child was asked to set the flashlight so that the light when turned on would fall on the card. The child had two tries for each setting, with 14 settings. He was scored correct if he was right either time. In addition, the proportion of times he changed the flashlight in the correct direction after a wrong first setting was obtained from the second settings, after errors. After 10 settings on this series the child was asked for an explanation and shown the path of the light on the cloth.

A set of *mimeographed drawings,* showing the mirror, the flashlight, and the card, in various positions, was shown, and the child was asked to draw a line showing where the light would go and to tell whether the light would go on the card or not. Finally, all the children in the groups which had slide training were asked if the task reminded them of anything else and were asked what rule they learned about how to set the slide.

Scoring

Performance scoring on the training series consisted of the number of trials to criterion, and on the test series consisted of the number of trials correct. The verbal statements were scored according to the following code:

Correct complete rule. The child states that the side angles are equal, or some equivalent of this statement, e.g., "The spaces on the sides are alike."

Partial correct rule. The child makes a statement about the way the light goes or a rule for judging a setting that excludes certain settings, and is correct as far as it goes, e.g., "It depends on how much more tilted the mirror is whether it is going to go higher or lower."

Incorrect rule. The child excludes certain possible settings with a rule that will sometimes produce wrong settings. "You aim at the corner of the mirror."

Vague, incomplete statements. The child makes a statement that is too vague to exclude any alternatives for the hearer, or says he doesn't know. "I try to imagine how the light will go." "The light goes up and then it comes back again."

The intercoder reliabilities of the above categories were satisfactory, ranging between 100 per cent agreement on the first category and 79 per cent on the second.

Summary of Design

The design consisted of presentation of a training series and a test series to three groups of children. The test series was identical for all three groups. The control group was trained on an irrelevant task, while the verbal and nonverbal training groups received training with the slide apparatus and mediation training that differed only in that special terminology was introduced to the verbal group and in that they were taught a verbal rule.

Results

Effects of Training on Performance

No differences appeared between the two experimental groups and the control group in performance on the test transfer series. The startling performance of the fourth grade boys in the control group led to an examination of various performance correlations with grade, sex, and spatial ability. On the *training series* boys and fourth graders did significantly better. In the nonverbal group all the PMA scores were positively correlated with slide task performance (Table 1). In the control group there was a significant tau of .48 between spatial ability and form reasoning scores and test (mirror) series performance.

These correlations suggest that boys, fourth graders, and children with higher spatial-form reasoning scores might have had outside encounters with the rebound phenomenon so that the special training had little effect. Rebound occurs, of course, in many kinds of ball games and in pool, which

TABLE 1

CORRELATION OF PRIMARY MENTAL ABILITIES AND PERFORMANCE (TAU)

	Training Series		
	A	*B*	*C*
Verbal Group ($N = 16$)			
Picture Vocabulary	—.39*	.06	.06
Spatial plus Form Reasoning	.20	.11	.03
Nonverbal Group ($N = 16$)			
Picture Vocabulary	.34*	.66*	.18
Spatial plus Form Reasoning	.13	.53*	.28*

* Tau significant beyond the .01 level.

some of the children said they played. In addition, the control children had higher form reasoning scores than the others.

Therefore the girls, the third graders, and the children with low spatial and form reasoning ability were examined separately (Table 2) as a more untrained group than the others. In each case there was significant improvement in performance with nonverbal training, compared to the control group. Perhaps, the experimental training was an insufficient increment to the previous training of the other children.

The seventh setting on test series B was a key item. The mirror was tipped steeply, and the target card was low, near the flashlight. With the

TABLE 2

MEDIAN PERFORMANCE SCORES ON TRANSFER TESTS

	Verbal	*Nonverbal*	*Control*	*p**	
				V vs. C	*NV vs. C*
Test A					
Total sample	4	5	4	*ns*	*ns*
3rd Grade	4	4.5	3.5	*ns*	*ns*
Girls	2.5	3	4	*ns*	*ns*
Low Spatial and Form Reasoning	4	4.5	4	*ns*	*ns*
Test B					
Total sample	9	9	7	*ns*	*ns*
3rd Grade	9	9	6.5	.08	.01
Girls	8	9.5	7	.097	.014
Low Spatial and Form Reasoning	9	9	7	$< .01$	$< .001$

* Mann-Whitney one-tailed test.

TABLE 3

PERFORMANCE ON KEY ITEM WITH SHARPLY TIPPED MIRROR

	TREATMENT					
	VERBAL		NONVERBAL		CONTROL	
	C	*U*	*C*	*U*	*C*	*U*
Immediate correct setting	2	2	1	1	1	0
Correct on second setting	2	3	1	2	1	0
Correct adjustment direction	4	1	2	4	0	3
Incorrect adjustment direction	0	2	0	5	2	9

NOTE.—Six-celled grouped χ^2 of incorrect direction vs. others significant at .01 level.
C means a correct verbal formulation at the transfer session, series B.
U means an incorrect or unclear formulation.

mirror thus tipped, the beam reflects up and to the left, quite high. The usual error is to aim the flashlight too high, thus sending the beam up to the ceiling.

This setting is important because it was an instance when an alternative setting rule usually followed would not work. Many children aim at a point somewhere between the vertical projection of the target and of the flashlight onto the mirror. When the mirror is relatively horizontal over the flashlight, this method is successful. When it is tipped steeply, it does not work. On a similar drawing only five of the 48 children drew correctly.

Thus, this setting is a sensitive test of whether the child is in fact balancing the angles of incidence and reflection and correctly visualizing the path of the light. The differences between groups in success on this single question are striking. Only two of the control group children were successful and few even adjusted the flashlight in the right direction for the second setting. Five of the children with nonverbal training and nine

TABLE 4

VERBAL LEARNING AND PERFORMANCE ON KEY ITEM WITH SHARPLY TIPPED MIRROR

	STATEMENTS AFTER LEARNING SESSION		
	Verbal Formulation	*No Verbal Formulation*	*Control*
Immediate correct setting	6	0	1
Correct second setting	6	2	1
Correct adjustment direction	8	3	3
Incorrect adjustment direction	2	5	11

NOTE.—Grouped χ^2 significant at the .05 level with $df = 2$.

of those with verbal training were successful (Table 3). In these two groups none of the children who gave a correct verbal rule made an incorrect adjustment. The relation of verbal performance at the learning session and transfer to the key item may be seen in Table 4.

Effects of Training on Verbal Responses

The verbal training had a clearly facilitating effect on the series B verbal performances. The proportion of complete statements of the principle taught at the training session is greatest in the verbal group and least in the control group (Table 5). Incorrect formulations are most frequent in the control

TABLE 5

VERBAL STATEMENTS AT TRANSFER SESSION

	Verbal	*Nonverbal*	*Control*
*Series A**			
Complete rule	2	0	1
Partial correct	4	8	5
Incorrect	1	0	1
Other	9	8	9
Series B†			
Complete rule	5	3	1
Partial correct	3	1	3
Incorrect	1	5	7
Other	7	7	5

* None significant.
† Verbal vs. Control for correct vs. incorrect yields p of .025 by Fisher t test. Verbal vs. Nonverbal for correct vs. incorrect yields p of .064.

group and least frequent in the verbally trained group. Of the eight who did not offer a correct formulation in the verbal group, four could not remember what they had learned at the first session when asked. Verbal training evidently does influence children's formulations or explanations in a transfer situation.

Some examples of the verbal formulations at the mirror session are these from the verbal group:

> *George* (7;1): I'd sorta put the flashlight so it goes at an angle. The other lady had a ball and you slide it off a thing and she had this other ball. . . . She told me it goes in an angle and it hits when it goes at a right angle. You put it at a right angle and it hits. . . . I took the thing and turned it around. If the ball was over here, the angles were the same so I'd go like this.
>
> *Ann* (7;9): It is going up now. It would hit the mirror and come down and the two sides would be even.

Ellen (9;0): Well with the other game I guess it would be if they had a ping pong ball tables with a little board and you did a ball down the slide and both sides were equal so I must say it came up there, and it would come down there so the sides would be equal . . . the spaces in between.

From the nonverbal group came the following:

Henry (7;3): I've done it before with a ball, rolling down the chute. It hits it and bounces off something. . . . The same with the flashlight. It is sort of like a ball. You aim it and it will bounce off of there. . . . If you put it slanted and the mirror was straight, it would bounce off at the same slant as the flashlight was on. If the mirror was slanted, you'd have to slant the flashlight more but it wouldn't come off in the same slant.

Rose (8;9): It goes up even. It is balanced. It would go up like this and off like that.

In the control group the following statement was *not* typical:

Stephen (7;4): You would make it so it would bounce onto the card. You look at the angle and you come down the same angle and you set the flashlight so that the angle would come down the same angle.

More characteristic were the vaguer statements:

Jean (9;1): I know that if it—when the mirror is turned upward, this way, if you turn it over this way, the reflection is going to be—the more you turn this around, and more the reflection is going to be higher. . . . When the mirror is turned this way, the more you tilt the flashlight the higher it is going to be. . . . It depends on how much more tilted it is whether it is going to go higher or lower. Which way it is going to go depends on what tilt the mirror is on.

Sandra (8;7): You just try to aim it close to the piece of paper.

Marie (8;1): I aim it opposite the card, but not too opposite.

The motor performance of the last four children quoted was markedly different, the first two scoring near the top of the distribution, the others near the bottom.

Verbal Performance in Relation to Motor Performance

Since verbal mediation must have occurred, motor performance was expected to be better for those showing verbal transfer. But, on the other hand, a verbal formulation may reflect, not verbal mediation, but the observations which produced better motor performance. In the control group, which had not received any prior systematic training and certainly not the verbal training, there was a relationship between verbal and motor performance (Table 6). Three of the four children who gave correct descriptions, either complete or partial, had the highest motor performances.

Furthermore, the group that offered an incorrect explanation had some slight tendency to have better performance than those who offered no explanation at all in the control group. It is not significantly different either from the group offering a correct explanation and those offering none,

TABLE 6

MEDIAN PERFORMANCE SCORES BY VERBAL SCORE ON TRANSFER SERIES B

	TREATMENT		
	Verbal	*Nonverbal*	*Control*
Complete rule	8	10	13
Partial correct	9	11	13
Incorrect	8	8	7
No rule	10	9	6*

* Significantly lower than rest of control group, at the .05 level, by Mann-Whitney test.

though these differ from each other. Under other treatment conditions this difference is attenuated, becomes nonsignificant in the nonverbal group, and disappears entirely in the verbal group. Thus, verbal training has an independent effect on verbal responses that obliterates the correlation with performance that is present without special training.

Transfer Effects of Spontaneous Verbalization

It was proposed that the children who formulated a verbal statement themselves during training might have a higher probability of producing it again during the transfer series and that it might have a closer referential relation to the performances. In the nonverbal training group five of the 16 children did produce spontaneously a complete description corresponding to the nonverbal training. Their performance at the training session did not differ from that of those who did not formulate their observations verbally, but their verbal transfer did differ. All five gave correct descriptions of series A of the transfer test, but only two of the five gave correct descriptions in series B where the scoring was more exacting.

A somewhat comparable difference occurs in the verbally trained group between those who repeat verbatim the phrase taught and those who use their own variations during training. While there was no relation between "parroting" and performance transfer, verbalizations were somewhat related. The children who merely repeated the teacher's formulation were likely to give less satisfactory descriptions at the transfer session.

DISCUSSION

The experiment had been formulated in terms of a transfer and mediation design, but it was evident in the analysis that many of the children had encountered elastic collision elsewhere. One child in the control group even used the term "ricochet" in talking of reflection from a mirror.

It is clear, however, that the children who came in with less outside influence improved under training. This is the more striking because of the reduction of incidental similarities between the collision and reflection problems. The experimenter avoided similar terminology, a different experimenter was used, and fortuitous similarities in equipment were reduced as much as possible. That is, the children showed improved performance on the series B task, which is the one most analogous to the training series, spontaneously without being reminded that the task might bear a relation to the slide and ball.

It is not clear just which aspect of the training during the first session was facilitative. Both groups given training had actual practice in aiming and adjusting the angle of approach, which as a visual-motor task would be related to the transfer series B. Both groups had been shown the path of the ball on paper and had drawn diagrams of the path to a criterion of learning. Clearly the facilitation derives from this training.

This facilitation could have arisen from arriving at a generally, but not always, correct aiming pattern. The successes with the partially usable "rules" would be the same for both sessions, and thus they would be transferable. Thus, not only the equal-angle formulation but certain others would have a fairly high proportion of success. The other rules might well receive more reinforcement because they are easier to apply, e.g., aiming midway between the projection on the board of the ball and the slide and adjusting at the second setting.

The fact that the general success of the nonverbal group is due in part to use of these alternative rules is suggested by the findings on key item B-7 on the transfer task. On this setting the children usually aimed where they would have had to aim if the mirror were more nearly horizontal. Thus, they betrayed the lack of any really systematic relation of their setting to the angle of the mirror. But in this case the children in the verbal group more frequently made a correct setting.

On the whole, the verbal group did not have as good performance scores as the nonverbal group. The difference between the total performance scores and the scores on B-7 suggests that the total scores reflect the use of any reasonably successful techniques. It is possible that the verbal training actually interfered with the discovery of alternative setting stategems. Only when the taught rule was clearly superior to the alternative rules was the verbal group superior, as on item B-7.

The verbal training used in this experiment was characterized by several special features. The terminology (N) and the information (P) were both novel, and no direct inference as to action ($P \rightarrow R$) is immediately evident. It was difficult for the children to discern the referents of the terms; the angles of incidence and reflection are, after all, visualized and not actually visible during aiming. In addition, the implications for adjustment of aim are not directly evident. It is likely that any easier generalizations about aiming would replace the use of the more intangible equating of angles.

Thus, when the verbal formulation had been taught, or even when it occurred spontaneously at the training session, it had little to do with the child's total performance in the transfer session. Even when it was available at the second session, as judged from overt verbalizations, there was no correlation with performance totals. But in the control group it can be expected that verbal formulations emerged from performance, hence the clear correlation between verbal statements and success in the control group.

Verbal training had two effects: it improved performance on a key criterial task, and it altered the quality of verbal formulations. The effectiveness of the transfer on verbal behavior is the more noteworthy when it is remarked that of the 12 children in the verbal group who could, when asked, recall what they had learned about the slide, two-thirds spontaneously had transferred this description to the mirror situation.

In the nonverbal group, which had not been given names for the relationships they saw depicted, only three children could, when asked, describe what they had learned about the slide. It is small wonder, then, that their verbal performance was very little superior to that of the control group.

In verbal transfer a much less complex situation obtains than in the postulated mediation of transfer of motor skills. Here there need only be a similarity of stimulus to elicit a similar verbal response. In the case of motor transfer in the nonverbal group there was also a similarity in the two overt features of the task. Only in the most sensitive task is there evidence that those with verbal mediation available to them may in fact have been using a somewhat different approach to the visual-motor task. Perhaps this verbal training oriented them differently to the slide and ball learning, and this practice with a different aiming method accounts for the differences, not second-session verbal mediation. On comparable key items in the first session aiming the verbal group did insignificantly better. The more marked differences found at the second session cannot be due to training session practice in different visual-motor skills. We conclude, then, that the differences in key item performance at the second session are due to the occurrence of verbal mediation which increases the probability of using the solution method that is most appropriate to this item.

This experiment is relevant to curricular planning and bears certain implications for educators. It confirms the impression that pupils do spontaneously relate learning that has different concrete content. But in this experiment a deliberate effort was made to plan the training with the slide and ball so that the strategems learned would be most relevant to the reflection task. The verbal training was planned so that the terms used would apply equally in both situations. There were several routes to transfer for these children; one was verbal mediation. But the use of verbal mediation rests, like any kind of transfer, on the assumption that the situations are similar enough or, more pertinent to the teacher's power, that what the children notice about the situations has sufficient similarity, so that the children think at time II about the "generalization" that they learned at

time I. In this experiment it was clear that many children did notice the similarity since they applied the terminology of the first session to the reflection problem. Yet this did not necessarily lead them to better problem solutions. Thus, the second necessary training is to link generalization to action, whatever that action may be. The great skill that children acquire in verbal learning is something of a hazard in that it is likely to reward both teacher and pupil so readily that the teacher overlooks the learning criterion she is most concerned with, which is not necessarily verbal learning alone. In this experiment we were concerned with performance as well as verbal learning. The link from speech to action was the weakest in the training in this experiment.

Summary

Elementary scientific training might utilize the possibility that principles applicable to one concrete domain will be relevant to another and that this relevance is not merely logical and analytic but psychological as well. This psychological relationship is tested by a transfer study on third and fourth grade children. If the relevance is evident without explicit verbal learning of the principle which could apply to both situations, then the group without verbal training should perform as well as the group with verbal training.

When the older and more skilled children are eliminated from the comparisons, so that a larger proportion of the variance in transfer is attributable to experimental training, it appears that the children did spontaneously profit from the earlier training without the links being explicitly indicated by the teacher. In a visual-motor aiming task using a flashlight and mirror to reflect on a target, children performed better who had practiced earlier with a ball rebounding from a board.

The group with additional verbal training did not show as much facilitation in the total motor performance as the group with only motor training. But on a key question which could not be solved as easily by aiming strategems other than the one taught, the verbal group was superior. The verbal group also was superior in the descriptions they offered of the principle involved in reflection.

Statements about the reflection principle could either influence performance or be derived from it. In the control group there was a correlation between performance and verbal statements, but not in the other groups. One reason for the lack of relationship in the other groups may be the lack of direct implication as to performance strategem in the verbal statement that was taught. Thus, a person might recall the statement, but his performance might not thereby be improved. On the whole, the study confirms the theory that verbal training facilitates transfer, if several necessary conditions are present.

References

1. Arnoult, M. D. Stimulus predifferentiation: some generalizations and hypotheses. *Psychol. Bull.*, 1957, 54, 339-350.
2. Bastian, J. R. Response chaining in verbal transfer. Studies on the role of language in behavior. Univer. of Minn., under contract number N8 onr-66216 with the Office of Naval Research, 1957.
3. Battig, W. F. The effect of kinesthetic, verbal, and visual cues on the acquisition of a lever-positioning skill. *J. exp. Psychol.*, 1954, 47, 371-380.
4. Dietze, Doris. The facilitating effect of words on discrimination and generalization. *J. exp. Psychol.*, 1955, 50, 255-260.
5. Gagné, R. M., & Baker, K. E. Stimulus pre-differentiation as a factor in transfer of training. *J. exp. Psychol.*, 1950, 40, 439-451.
6. Gibson, E. J. A systematic application of the concepts of generalization and differentiation to verbal learning. *Psychol. Rev.*, 1940, 47, 196-229.
7. Hake, H. H., & Eriksen, C. W. Effect of number of permissible response categories on learning of a constant number of visual stimuli. *J. exp. Psychol.*, 1955, 50, 161-167.
8. Howes, D. H., & Solomon, R. L. A note on McGinnies' "Emotionality and perceptual defense." *Psychol. Rev.*, 1950, 57, 229-234.
9. Jeffrey, W. E. The role of verbal and non-verbal responses in mediating an instrumental act. *J. exp. Psychol.*, 1953, 45, 327-333.
10. McGinnies, E. Emotionality and perceptual defense. *Psychol. Rev.*, 1949, 56, 244-251.
11. Murdock, B. B. Transfer designs and formulas. *Psychol. Bull.*, 1957, 54, 313-326.
12. Norcross, Kathryn J., & Spiker, C. C. Effects of mediated associations on transfer in paired-associate learning. *J. exp. Psychol.*, 1958, 55, 129-134.
13. Porter, L. W., & Duncan, C. P. Negative transfer in verbal learning. *J. exp. Psychol.*, 1953, 46, 61-64.
14. Robinson, J. S. The effect of learning verbal labels for stimuli on their later discrimination. *J. exp. Psychol.*, 1955, 49, 112-114.
15. Russell, W. A., & Storms, L. H. Implicit verbal chaining in paired-associate learning. *J. exp. Psychol.*, 1955, 49, 287-293.
16. Underwood, B. J. Associative transfer in verbal learning as a function of response similarity and degree of first-list learning. *J. exp. Psychol.*, 1951, 42, 44-53.
17. Vanderplas, J. M. Transfer of training and its relation to perceptual learning and recognition. *Psychol. Rev.*, 1958, 65, 375-385.
18. Young, R. K., & Underwood, B. J. Transfer in verbal materials with dissimilar stimuli and response similarity varied. *J. exp. Psychol.*, 1954, 47, 153-159.

TRAINING AND A LOGICAL OPERATION BY CHILDREN[1]

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Research on children's solution of logical problems has for many years been dominated by the extraordinary ingenuity and breadth of Piaget and his collaborators. They have consistently held the position that children's predictions and explanations of physical phenomena can be described in terms of a maturation of capacity to utilize increasingly difficult logical operations (2, 5).

The Piaget hypothesis is a singularly important one. If there are fundamental patterns of logical maturation, then it may be that the scaling of educational curricula in science can be determined with more precision by some appropriate "logical age" measure than the current trial-and-error methods. On the other hand, instruction in elementary mathematics demonstrates that logical operations can be taught. The question might be rephrased: Could children be taught earlier to use methods characteristic of a later age? And secondly, is there, when deliberate training is attempted, still a typical order of operations whereby certain skills must be mastered before others?

Neither of these questions is raised by Inhelder and Piaget (2) in their recent book on children's logic. One common criticism of their earlier

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work has been ingeniously met; they have devised procedures calling for many predictions and manipulations of instruments by children so that their findings are not made ambiguous by dependence on a child's limited vocabulary and idiosyncratic meanings.

Yet there remain two difficulties in drawing inferences from their work. A major drawback is their failure to control training histories or at least to attempt by systematic training to compensate for inequalities. The conclusions they have reached regarding maturation rest primarily on age changes, and, since experience accrues with age, the issue of the limits of educability remains unresolved.

Furthermore, logical operations are necessarily inferred from performance. If statements are made as to maturational progression in mastery of logical operations, it becomes important to generalize beyond specific procedures. Thus, many procedures may be said to require the same logical operation for successful performance. But how shall we know when two problems require the same logical operations?

Inevitably one starts with logical analysis. Piaget, as a logician, does so with more sophistication than others. However, a logical analysis remains a hypothesis. Piaget himself protests the confusion of logic and psychology (4). Some other criterion must be used to determine that two problems similar in logical structure as seen by a logician are similar on the plane of psychological process. Implicit in Piaget's work is the criterion of age correspondence. When two problems are similar in logical structure by his analysis and similar solutions are characteristic of a given age group, then it may be said that they are psychologically similar and the same logical processes are used by children in their solution.

Age correspondence is not a completely reliable criterion. Because changes in knowledge are correlated with age, progress in solutions might appear to be correlated simply because added experience in both problems has occurred. Within each age group it might yet be true that a child who "solves" one problem may do no better at the supposedly identical problem than other children. Age and experience must be held constant for the issue to be settled, for each operation in question.

There are at least two possible solutions of less ambiguity. One is the traditional technique of factor analysis of problems with age and training controlled. In the practical conditions of large-scale factor analytic studies training is not usually adequately controlled, and there is some doubt whether it can be. Another approach might be the use of a transfer of training design to test the improvement produced by training on a problem in a second problem which theoretically requires identical operations. Such transfer designs have been described by Murdock (3), and a complex application to children's logic is described in Ervin (1).

In the following study the latter technique is explored. Two criteria are used to specify whether problems are logically related: Are children capable of solving a second problem, which introduces no new materials or vocabu-

lary, as successfully as variants of the first, and can the same children who solved the first solve the second? Finally, the issue of maturation may be raised. If training is controlled to the extent of training all children to a criterion of mastery of the easier problem, is there evidence of a maturational component in the more difficult problem, judging from a correlation between success and mental age measures?

The problems used in this study are drawn from the phenomenon of the action of a body on an inclined plane. The three-factor relationship between truck weight, counterbalance weight, and inclination determines the action of a toy truck on a slope. Children were given training in quantitative prediction of covariation between two of these variables when the third was constant and then were tested on a second problem involving variation in all three.

Method

Subjects

Sixteen children, half boys and half girls, drawn from the third and fourth grades, were tested. Their ages varied between 7-3 and 9-1. Half the children were above 120 in IQ and half below, as assessed by the Gates measure available in the school records, a distribution that obviously places them above the average of the population. The Primary Mental Abilities Test had been administered in part, and the mental age scores for the subsections are reported in Table 1.

Table 1

PRIMARY MENTAL ABILITY SCORES

	Third Grade		Fourth Grade	
	Mean	*SD*	*Mean*	*SD*
Vocabulary	11-10	1-0	13-0	1-2
Spatial Ability	9-9	1-1	10-2	1-3
Form Reasoning	10-8	1-0	11-3	2-5

Apparatus

A 30-inch inclined plane was attached by a hinge to a base, and at the other end a bolt with a wing nut was passed through the plane and a pair of 10½-inch slotted vertical supports rising from the base. The plane could thus be raised or lowered to various positions and secured with the wing nut. On the plane, which was 1½ inches wide, was a raised center, allowing a Dinky Toy truck to travel without swerving off the track. At the upper end of the plane a 1-inch pulley was secured, and a string from the

truck passed through the pulley to a ring from which hung a set of S-hooks to which weights could be attached. These weights were fishing sinkers with metal loops on them and were alternatively placed in the truck or on the S-hooks. They are referred to as "men."

Procedure

A lengthy standardized verbal interrogatory was conducted. Each prediction in parts A, B, and C was tested with the apparatus.

A. Have you ever played tug-of-war before? Can you tell me what happens when there are more children on one side than there are on the other? What would happen if there were the same number of children on both sides but on one side the children were stronger and heavier? Suppose you had the same number of boys and girls on both sides and they were all the same weight and all the same strength, what would happen? Have you ever pulled a wagon or ridden a bicycle up a hill? Is it harder going up a hill or down a hill? Do you think it would be harder on a steep hill or a low hill? Do you think it would take more people to pull a wagon up a high hill or a low hill? Can you tell me why the truck doesn't roll down the hill? What would happen if I ask you to put two men on the truck? Try them. How can I keep the truck steady? How many men should I put on the rope? (The experimenter continues to propose additions to the truck, then additions to the rope, then subtractions from truck and from rope. Each is tested until at least seven trials are completed including four successive correct trials.)

B. Now do you remember what happens if we have a steep hill or a shallow hill? Suppose there were four men in the truck and two pulling on the rope. What would happen if I make the hill steeper? What can we do to stop it? What if we made the hill shallower, what would happen? What can we do to stop that? Now let's make the hill half as high as it was before. There are no men in the truck and no men on the rope. What do you think will happen? We will take this off to balance it here. Suppose I had four men in the truck. How many men did it take to hold four men on a steeper hill? Do you think it would be the same here? Would it be harder or easier on the shallow hill? Would you need more or less men? How many men do you think it would take? What will happen if I add one man to the rope? What can we do to make it balance? (The child continued to make predictions concerning four test questions, each checked with the apparatus. Then, the experimenter reviewed the procedure.)

C. How many men did it take to hold a truck with four men in it on a steep slope? How many men did it take when it was half as steep? How many men would hold a truck with eight men on a steep hill? (The procedure continues through eight questions in which successively the contrast is made between various degrees of slope with the men in the truck constant and predictions are tested.)

Let's go over this. You found that on a shallow hill, one man could hold up a truck with four men in it. So that the number of men in the truck is four times the number of men on the rope. And when the hill is twice as steep, the man can hold up two men. So the number of men in the truck is twice the number of men on the rope.

D-1. Now suppose I add more men to the truck and I also make the hill steeper, what will happen? Why? What should I do with the man on the rope to make it steady?

D-2. What would happen if I put more men in the truck and made the hill lower? Why?

D-3. What do we do if the truck is balanced and we want the truck to go uphill? Suppose there are no more men.

D-4. What will happen if I add more men to the truck and have fewer men on the rope? Why? What could I do to the hill to make the truck balance?

D-5. What will happen if I add more men to the rope and take them out of the truck? Why? What should I do to the hill to make the truck balance?

D-6. What would happen if I add more men to the truck and add men to the rope, too? Why?

Results

Training Trials

The children all reached criterion quickly on the first series of trials. The two-to-one relation between the weight on the truck and on the rope was not immediately obvious; all of the children first assumed a one-to-one relation. After the first trial, however, all but three succeeded in predicting all the succeeding changes correctly.

Three third graders made various errors when the rope weights rather than the truck weights were first manipulated by the experimenter. This step is perhaps more difficult because one must see that either side of an equivalence or balance relationship can be manipulated, or equate the experimenter's manipulation with the subject's own response.

Series B with a shallower slope was more difficult from the standpoint of the arithmetic required. The ratio was one to four rather than one to two as on the steeper slope. Many of the children continued to use the ratio they had learned on the steeper slope. When a weight was added to the rope, the children often would keep adding two until balance was achieved. All of the children who had trouble with the first series also had difficulty with series B where the slope was less. The fourth graders made fewer errors than the third graders. The only children who were still using the 2:1 ratio by the third and fourth trials in series B were three third graders.

The third graders had had less training in multiplication than the fourth graders. One child betrayed a predilection for using additive operations rather than multiplying: When two were removed from the rope, she removed first four, then six from the truck. "It has to be six because if two are off the rope and four are off the truck then the rope goes down. It has to be six because if one holds four. . . ." "How many are two times four?" "Oh, eight, I see, take off eight. Then the four left on the truck hold up one on the rope. . . . I didn't think of two times four."

Quantitative predictions when the slope was changed were demanded on series C. Only two children failed to make the predictions successfully.

Both were in the lowest quartile on the PMA measures, and the fourth grader was the lowest in his class on the arithmetic problems achievement score.

Test Series D

On the test series no apparatus was manipulated and no reinforcement was offered. The questions were designed to test the child's ability to predict outcomes when two, rather than one, of the variables are changed. Directional or qualitative, rather than quantitative, responses were requested.

The reciprocal relation between the weights in the truck and on the rope is an obvious one to the eye and is familiar in children's experience. The role of the slope is more abstruse. When the children were asked what kinds of manipulations would make the truck move when it was stationary, or stand still when it was moving, the usual response was to change the number of men in the truck or on the rope. Probing failed to elicit slope change as a proposal from six children, when they were asked how to make a truck go up hill. Again, when they were asked how to create balance, four children suggested a slope change in the wrong direction. In all, half of the children had some difficulty in utilizing the slope as a manipulable variable.

A second issue was whether the children could make predictions about an outcome when two variables rather than one were changed. Only three responses were possible: that the truck would go up, go down, or stay steady. The children had seen and talked about all three outcomes earlier. Theoretically, regarding the three variables as functionally equivalent should produce predictions of extreme effects when two variables supplement each other and of balance or ambiguity when they are complementary.

The supplementary relations questions were easiest, since a child need know only the effect of one of the variables and ignore the other to produce a correct answer as long as the question required a qualitative rather than quantitative prediction.

The complementary manipulations questions—e.g., adding men to the truck and decreasing the slope—were more difficult for two reasons. One is that they require taking both variables into account. Guessing is less likely to produce a correct answer. The second difficulty lies in the children's quantitative assumptions. Complementary changes only produce balance if they are of a particular amount. Otherwise, any result could appear. Some of the children recognized this complication.

The first pair of questions placed the slope and the number of men on the truck first in a supplementary, then in a counterbalanced position. All of the children predicted the supplementary effect when the hill was steeper and more men are in the truck. But when a complementary change, more men in the truck and a shallower hill was proposed, three predicted that the truck would go up, three that it would go down, and the other 10 that it would balance. Two children who first said it would go up changed to

say it would go down. The reasons each offered cited one of the two variables involved, omitting the other.

In a similar fashion children did not have difficulty with the two supplementary questions regarding the weights on the rope and the truck. The last question proposed the addition of men to both the rope and the truck, a complementary change. Four children predicted the truck would go uphill and none that it would go downhill. The assumption seemed to be made that equal numbers were being added to both sides. This error was in a sense quite a subtle one, then, for it indicated a utilization of equivalence that took into account the discrepancy in the numbers needed on each side, that is, that a change in one factor was equivalent to a different degree of change in the other. One child commented, for instance, the "there is supposed to be less on the rope than in the truck" to account for her prediction that the truck would go up the slope. Another said the truck would go up if an equal amount is added. If the amount were not equal, the outcome "depends on which side has more, how much more and what the distance is."

At least half of the children failed in some respect in solving the test problems. Therefore, it can be concluded that the test problems did involve some greater difficulty than the training problem; or, at least, they are not simply variants of the same problem. The children who did not reach the learning criterion on the training trials on the first problem did no worse than the others in the test problems.

Not only did the training fail to prepare the children adequately for the test items; there is evidence that mental age measures are related to performance. If one examines the record of the seven children who were low on both the Gates measure of mental age and combined PMA scores, it appears that these children performed poorly both on the training and the test trials. They included two of the three who made mistakes on series A, two of the three who did not complete series B, and the two who had errors in series C during training. In the test series this group included all who suggested a slope change in the wrong direction, four of the six who, under probing, did not mention the slope as a means of achieving balance. The only test item not related to mental abilities was success in predicting balance when there were complementary changes in two variables.

Which mental abilities were relevant? No consistent patterns appeared in the training series. In the test series, *mentioning* the slope as a relevant variable was related to spatial scores but not to verbal ability ($p < .01$). Suggesting the appropriate *direction* for changing the slope was related to verbal ability, as assessed by the PMA measure ($p < .05$) and the Gates mental age ($p < .01$), but not to spatial ability. Mann-Whitney tests were used to evaluate these differences. The fact that the tests called for different mental abilities suggests that visualization and verbal memory might be involved in different aspects of the problems even when the problems are presented as verbal hypothetical questions.

Discussion

The purpose of this study was to explore a procedure for testing the *logical relationship* between two tasks. If training in the less complex task is the only crucial aspect of performance on the second task, then the children who made errors in the complex task series should be those who failed to reach a training criterion. This was not the case. Of the eight children who failed to use the slope variable appropriately during testing, only three had difficulties during training. Two of the three children who failed to complete training on series B had no errors on the test.

It must be concluded that at least in this small group the training did not successfully eradicate test error even when the training was successfully completed. Since the children did not during the training actually manipulate the inclination of the plane, it could be argued that the training did not give them equal preparation to use all three variables as functional equivalents. That is, perhaps another procedure might have produced greater success on the test series. As the procedure stands, it might be concluded that the demands of the test series are not identical with those in the training problems and the logical operations required cannot be held to be equivalent.

Furthermore, the relationship to mental ability is significant even in the very small sample. This finding lends support to Piaget's contention that there is a maturational component in the test problem. The correlation with mental ability does not appear to be due merely to the verbal ability required in answering hypothetical questions. It appears that maturation must be treated in terms of complex abilities even in children as young as this sample.

Since training had been available for all the children, it can be reasonably concluded that the differences between them are not wholly due to experience. Ultimately such a question can never be answered since training cannot be totally controlled. But with a design including training it is possible to reach more secure conclusions than with the simple age comparisons alone used by Piaget and Inhelder.

Summary

A small descriptive study was conducted on a group of third and fourth grade children in an attempt to test whether two tasks were logically identical. Only half of the children performed the transfer tasks with complete success, thus demonstrating that the tasks were different. The difficulties seemed to lie in treating as functionally equivalent variables that differed in sensory attributes and in the children's previous manipulatory experience. It was found that success on the various transfer tasks, once training on relevant experience had been given, was related to spatial and to verbal ability. It was concluded that such evidence argues more persuasively for

maturational aspects in the task than does evidence of age changes in performance when training has not been provided.

References

1. Ervin, Susan M. Transfer effects of learning a verbal generalization. *Child Develpm.*, 1960, 31, 537-554.
2. Inhelder, Bärbel, & Piaget, J. *The growth of logical thinking.* New York: Basic Books, 1958.
3. Murdock, B. B. Transfer designs and formulas. *Psychol. Bull.*, 1957, 54, 313-326.
4. Piaget, J. *Logic and psychology.* New York: Basic Books, 1957.
5. Piaget, J., & Inhelder, Bärbel. *The child's conception of space.* London: Routledge & Kegan Paul, 1956.

THE MEASUREMENT OF MATERNAL CARE[1,2]

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Maternal care is commonly assumed to have an effect upon infant behavior, but experimental verification of the assumption is still only sketchy. Of general notions about possible relationships between maternal care and infant behavior there is no dearth, nor are suitable measures of infant behavior lacking. Rather, it is measures of maternal care which are needed before statements concerning the effects of maternal care upon infant behavior can be drawn in a more precise, and hence testable, form.

Questionnaires, interviews, and case histories have customarily been used to obtain assessments of the mother's personality traits and attitudes and to obtain reports of her child rearing practices. But personality assessments and retrospective accounts are several steps removed from the actual care the infant receives (2) and, furthermore, do not easily lend themselves to the kinds of exact measures needed for statements of association.

The purpose of this paper is to describe a method of measuring maternal care in terms of the actual operations the mother performs in caring for the infant. It is a method which gives direct access to many of the important environmental events of the infant's life and thus establishes more closely the rationale for relating maternal care to infant behavior; at the same time it should be possible to gain clues to the mother's attitudes and personality traits from her caretaking behavior. The method employs the technique of time-sampling maternal care as it occurs in its natural setting. As demanded by the technique (1), both the items of behavior to be recorded and the time schedule of observations are exactly specified in advance. The details of the method will be illustrated by an account of a study in which the care given three-month-old infants in their own homes was compared with care given

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[1] Adapted from papers read at meetings of the American Psychological Association (4) and the American Orthopsychiatric Association, 1959.

[2] I wish to thank Helen W. Ross for her assistance throughout the study.

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by an institution. The results obtained will be presented and then used to evaluate the method's success in providing the needed measures.

Method

Subjects

Ten infants were the subjects of study; five of them were home infants, and five were residents of an institution.[3] The mean age of the home *Ss* was 3.4 months (range, 3.2 to 3.7), of the institution *Ss*, 3.5 months (range, 3.2 to 3.8). Age was the only criterion used for choosing the *Ss* in the institution. In addition to age, home *Ss* had to be "only" infants of parents of better than average socioeconomic status, requirements which it was expected would increase the probability of finding a difference between home and institutional care. The home *Ss* were located by word of mouth, and requests for cooperation were made by telephone. It was necessary to ask only six mothers to find the five *Ss*; one refused on the plea of personal illness. All *Ss* were females except for one male in the institutional group.

Description of Homes and Institution

The *Ss* and their parents lived without other relatives in small houses or apartments which were simply but imaginatively furnished. Each *S* had his own room.

The *Ss* in the institution, resident since birth, lived in a large room which housed 19 infants. The caretakers included the Sister in charge, who was a trained nurse, attendants, and volunteers. In general, the caretakers were sensitive to the needs of the infants, while the infants themselves appeared to be well-developed, active, and responsive.

Procedure

The Checklist. On the basis of observation and trial (3) a checklist composed of 42 items was drawn up, 30 for mothering activities and 12 for infant activities (Table 1 gives the items). Of the 30 mothering items six recorded the location of *S* in his environment, four the number of people in his room, and four the number of people within six feet of him.

The remaining 16 items recorded activities more closely related to mothering. "Caretaking" was an all-inclusive item which was checked if at the moment of observation someone was doing something for *S* while in proximity to him. "*N* of caretakers" recorded the number of different caretakers who cared for *S* during the eight-hour period of observation. The last 14 items were sufficient to cover all the caretaking operations performed by people in caring for three-month-old infants at the level of analysis selected for study here. Although all items were defined in detail, the behaviors included in them need no comment, with a few exceptions. "Talks" was

[3] The generous cooperation of Sister Thecla and the staff of St. Ann's Infant Asylum, Washington, D.C., is acknowledged with pleasure.

checked when the caretaker talked to anyone and not specifically to *S*; her speech could be thought of as providing auditory stimulation for the infant. "Plays" included both social play of caretaker and infant *and* caretaker's initiating infant's play with toys. The item "Other" had to be used very infrequently; it covered such caretaking activities as giving *S* vitamins and weighing him.

It should be noted that the caretaking activities were not considered as mutually exclusive. Rather, all the activities occurring at any moment of observation were checked; thus, a caretaker could be bathing the infant, looking at his face, and talking to him on the same observation.

Although the purpose of the study was to measure the caretakers' activities, a number of infant activities which served to delineate maternal care were also included.

Time of Observation. For each *S* a period of eight hours was sampled according to the following schedule: *O* looked at S for a full second and then recorded on the checklist what he was doing, if someone was caring for him, the nature of the caretaking act, where he was, and how many other people were in his environment. *O* could take as long as 14 seconds to complete the record, but in any case she did not look up again until the 15th second when she again observed *S* for a full second. In this fashion, four observations were made in each minute for a total of 10 minutes. After a break of five minutes another sample of 10 minutes was observed. Thus, the first 10 minutes of each quarter hour were sampled for four consecutive hours, that is, from 9 A.M. to 1 P.M. on one day and from 1 P.M. to 5 P.M. on the next day, to make a total of eight hours. There were three *O*s in all, but only a pair for each infant, one observing the first four hours, and the other, the second four.

Observers' Behavior. The *O*s endeavored to put the mothers and the attendants at their ease by being friendly and by conspicuously making the infant the focus of observation. The *O*, for example, stayed in the room with *S*, whether he was asleep or awake, and continued to make observations. The readiness with which *O*s were accepted was reassuring, as was the extent to which people went about the business of caring for *S as though* they were not being observed. Mothers, on questioning subsequent to the period of observation, said that *O*'s presence inhibited only their more "foolish" behavior with the infant, e.g., using nonsense syllables, singing, etc. The effect of *O*'s presence will be raised again in the Discussion.

Scoring. The score was the frequency of occurrence of each item over the eight-hour period for each subject. From these scores a mean score for each item was derived for each group of five *S*s.

Since 40 observations were made during each 10-minute period, the total number of observations for the eight-hour period was 1280. Dividing the mean scores by 1280 could give percentages of occurrence; and, since the observations were systematically distributed throughout time, the mean score could also be translated into hours and minutes.

Observer-Agreement. To check the reliability of the observations, *Os* made independent simultaneous observations during 64 10-minute periods. Thirty-five of the periods occurred before the study began, the rest at intermediate points as the study progressed, in order to insure continuing agreement. The observations were made on seven *Ss*, four in the institution and three in homes, none of whom were subjects in the study.

The amount of observer-agreement for each item was calculated by two different methods. In the first, a percentage of agreement was obtained by dividing the number of agreements by the combined number of agreements and disagreements. Here an agreement was a tally identical in both records; that is, both *Os* agreed not only in *identifying* the item but also in the *timing* of the item; agreement on the absence of an activity was *not* counted as an agreement. The median percentage of agreement for all items was 89.8 (range 16.7 to 100.0). As one might expect, there was some tendency for *Os* to agree more often on frequently occurring items. (The rank-order correlation between percentage of agreement and frequency of items was .71, $p < .01$).

In the second method, observer-agreement was calculated by correlating the frequencies obtained for each item. The median of the product-moment correlations was .97 (range .35 to 1.00).

On the basis of these findings the method was judged to have sufficient observer-agreement to warrant a measure of confidence in the results obtained by its use.

TABLE 1

MEANS AND RANGES OF MATERNAL CARE AND INFANT ACTIVITY
N of Infants in Each Group = 5
N of Observations for Each Infant = 1280

		HOME		INSTITUTION	
	Item	*Mean*	*Range*	*Mean*	*Range*
**	Caretaking	475.2	347– 617	105.8	74– 144
**	*N* of caretakers	1.4	1– 2	6.0	5– 8
**	Looks at face†	140.2	109– 173	28.4	6– 36
**	Talks	55.8	26– 105	7.8	0– 19
**	Talks to infant	166.2	51– 310	17.0	12– 22
**	Pats	26.2	9– 44	2.0	1– 4
	Shows affection	3.6	0– 14	0.2‡	0– 1
*	Plays	11.8	4– 25	0.8‡	0– 4
**	Holds	285.4	196– 394	45.6	11– 70
**	Diapers	37.4	27– 57	5.6	1– 10
	Bathes	35.2	0– 103	8.8	6– 11
**	Feeds	154.4	72– 198	28.6	4– 43
	Dresses	11.2	0– 28	16.2	6– 31
**	Adjusts position	6.8	0– 11	2.2	1– 4
	Rocks	37.2	0– 138	2.2	0– 4
	Other	14.2	8– 20	11.4	3– 18

(*table continued on next page*)

TABLE 1 (*continued*)

MEANS AND RANGES OF MATERNAL CARE AND INFANT ACTIVITY
N of Infants in Each Group = 5
N of Observations for Each Infant = 1280

		HOME		INSTITUTION	
	Item	*Mean*	*Range*	*Mean*	*Range*
	Location of Infant				
	In crib	787.0	667– 908	908.4	699–1081
**	In arms	258.6	179– 391	46.2	8– 76
**	Seated	0.0	...	260.0	128– 530
	Bathinette	86.0	27– 139	41.2	19– 70
	Other location	148.2	2– 327	24.2	0– 112
**	Out of own room	304.4	153– 391	43.0	21– 77
	N Adults in Room				
**	0	690.0	466– 899	263.0	178– 352
	1	534.8	372– 814	464.4	416– 568
**	2	34.8	0– 136	246.0	182– 329
**	3+	20.0	0– 99	304.2	210– 361
	N Adults within 6 Ft.				
**	0	755.5	652– 919	1062.6	1022–1093
**	1	492.2	361– 621	161.0	130– 213
*	2	12.8	0– 38	45.0	33– 68
	3+	19.5	0– 78	11.4	5– 18
	Infant Activities				
	Awake	847.4	565–1081	928.6	647–1042
	Vocalizes	54.2	22– 81	38.4	1– 76
	Vocalizes to mother	9.6	1– 30	3.0	0– 5
	Protests	14.4	5– 21	20.6	1– 59
	Fusses	31.4	14– 46	43.6	19– 71
	Cries	23.6	2– 64	14.8	0– 47
	Finger in mouth	103.8	0– 312	69.0	10– 111
**	Bottle in mouth	54.4	0– 146	298.8	170– 435
*	Plays with toy	62.8	9– 168	18.2‡	0– 91
	Plays with hand	8.4	2– 20	41.6	1– 117
*	Plays with dress	0.0	...	8.4	2– 20
	Bursts of activity	32.6	13– 78	46.0	18– 92

† Caretaking items not mutually exclusive.
‡ Mean based on one case.
* Difference between groups significant at .05 level, two-tailed test.
** Difference between groups significant at .01 level, two-tailed test.

RESULTS

Table 1 gives the means and the ranges of the scores for the items of maternal care and infant activities.

Because the variances of the data on caretaking were not homogeneous, a finding to be discussed later, the nonparametric Mann-Whitney test was used to assess the significance of the differences between the means of the

two groups. (The results obtained by this test paralleled very closely those obtained by a *t* test with reduced degrees of freedom.) Two-tailed tests seemed indicated because what was at test was the power of a method to differentiate between two groups.

Caretaking

Amount of Caretaking. The range of frequencies for "Caretaking" in the two groups not only did not overlap but were in fact widely separated. Home infants were cared for on 37 per cent of the observations to the institution infants' 8 per cent. Thus, they received care 4.5 times as often.

Number of Caretakers. Most commonly the mother was the only caretaker for the home infant during the period of observation. In one home, however, a father, and in another, an aunt, gave some caretaking. The institution infant, on the other hand, was cared for by six different caretakers during the eight-hour period of observation.

Caretaking Activities. Table 1 shows that the home infant received more of every caretaking activity than the institution infant, with the exception of "Dresses." While the home infant received care 4.5 times as often, the differences in amounts of different kinds of caretaking were even greater. He was looked at 4.9 times as often, fed on 5.4 times as many observations, held 6.2 times as often, and talked to 9.5 times as often. Some less frequent kinds of caretaking occurred even more often in the home. For example, the home infant was patted 13.1 times as often, played with 14.8 times as often, rocked 16.9 times as often, and shown affection 18.0 times as often.

The results also reveal that in most caretaking activities the differences were so great that there was no overlapping of scores between the two groups. All the differences were statistically significant, except those for "Shows affection," "Bathes," "Dresses," "Rocks," and "Other."

Amount vs. Kind. The difference between care in the home and in the institution appeared to be not in the kinds of caretaking activities (as defined here) but rather in the amounts of the different kinds. First, every activity performed by a mother in the home was performed, however infrequently, in the institution. Second, there were marked similarities between home and institution in the caretaking activities occurring most frequently. For the home, the activities in order of magnitude were "Holds," "Talks," "Talks to," "Feeds," and "Looks at face"; in the institution the order was "Holds," "Feeds," "Looks at face," "Talks to." And lastly, the ratio of each caretaking activity to the total amount of caretaking was similar for home and institution. Differences, therefore, tended to be differences in amounts and not in kinds.

Location of Infant. The infant in the institution spent more time in his crib than the home infant, but the difference was not significant. When the home infant was out of his crib, he was most often in his mother's arms;

in contrast, the institution infant, when out of his crib, was most often seated in a swing. "Other location" occurred significantly more often for the home infant and included play pen, parents' bed, and sofa. The home infant also spent much more time out of his own room. The comparison, however, is not entirely appropriate: the institution infant's room was often as large as, or larger than, the entire apartment of the home infant; and different parts of his room were used for different purposes and hence were furnished differently.

Number of People in the Environment. The institution infant spent less time alone, with no one in his room, than the home infant. Furthermore, there were more often two or more adults in the room with him. But, because the room in the institution was so large, these people were often at a distance from him. Thus, on the one hand, the institution infant saw and heard more people upon occasion, while, on the other, he more often had no adult in his *near* environment. The home infant had far fewer persons in his environment, but these few (most often, the mother, of course) were more often with him.

Variability of Caretaking Activities. Not only did the means for maternal care differ in the two groups, but, as has been noted earlier, the variances also differed widely. On 14 of the 16 mothering items, the ratio of home variances to institution variances was greater than 1.0, the median ratio being 19.5. Only for the items, "*N* of caretakers" and "Other," were the institution variances greater.

The differences in the variances present more than a statistical problem. They suggest that the care home infants receive may vary a great deal from one home to another, while the care given in an institution may be more similar from infant to infant. If this conclusion is warranted, and if maternal care does affect infant behavior, then one might expect home infants to differ more among themselves, institutionalized infants to differ less. Of course, repeated measures of maternal care in the same homes would be needed before definitive statements could be made about the variability of care between individual mothers. One might also find by means of repeated measures in the institution whether some infants elicit more care than others.

Infant Activities

Contrary to the findings on caretaking activities, measures of infant activities showed much smaller differences between the two groups, as may be seen in Table 1. In only three activities, "Bottle in mouth," "Plays with toy," and "Plays with dress," were the differences large enough to achieve statistical significance. All three were activities which reflect differences in the caretaking practices of the two environments rather than in infant behavior; the institution infant's bottle was propped; he had few, if any, toys in his crib; and he wore a short, loose shirt. If "Plays with toy" is

combined with "Plays with hand" and "Plays with dress," the difference between the groups becomes negligible. One can conclude that, in the absence of toys, the infants in the institution played an equal amount, but with their hands and their clothes, that is, with what the environment offered.

Some differences in other infant activities were large, to be sure, but the variability within the groups was also large. The following statements of difference may be presented, but only tentatively, because they do not possess statistical significance: the home infant slept more, vocalized more, protested and fussed less, but cried more often, than the infant in the institution. He more often had a finger in his mouth and was physically less active.

Variability of Infant Activities. It will be recalled that the variability in caretaking activities was much greater in the home than in the institution. One might therefore have expected a similar difference in variability to appear in the infant activities. The data, however, did not support the expectation, for the variances of infant activities in the two groups of infants were similar.

Part vs. Whole Measures

Now that differences in maternal care in institution and home have been demonstrated for samples of eight-hour periods, it may be asked whether shorter samples would have yielded differences of the same magnitude. To answer the question the results for the first four hours (9 A.M. to 1 P.M.) were compared with those for the second four (1 P.M. to 5 P.M.). Specifically, the differences between the means for home and institutional care in the morning and between the means for home and institutional care in the afternoon were tested for statistical significance by the Mann-Whitney test. On 38 of the 42 items the differences were of the same magnitude, the 38 including all the caretaking activities. In fact, the means for caretaking in the home were identical for morning and afternoon (237.6), while in the institution they were 51.6 for morning and 54.2 for afternoon. A four-hour sample of maternal care then would have been adequate to obtain most of the differences yielded by the eight-hour sample.

Conclusion and Discussion

Two separate topics may be considered here, the results of the comparison of maternal care in two environments and an evaluation of the method. The first will be discussed only briefly because the comparison was made primarily to illustrate the method.

Results of the Study

The results showed that the home infant had many more contacts with a mother than the institution infant with a caretaker. Not only was more

done for him but he was brought into contact with more things. He had a richer life, a more complex environment. At the same time, one can speculate, his life was probably more the same from day to day. To the extent that a mother gave care in her own way, his life would lack the kind of complexity brought about by many different and frequently changing caretakers.

While the contrasts in care were noteworthy, so too were the similarities. The results showed, for example, that caretaking activities were similar in kind and in order of frequency, whether in home or in institution.

That no differences of statistical significance were found in the infant activities (that is, in those not dependent on caretaking practices) raises several questions. It may be that, infrequent as the institutional care was, it was nevertheless sufficient at this age to arouse and maintain behavior similar to that shown by home infants. Indeed, the very infrequence and variableness of the institution's schedule of reinforcement, in contrast to the home's more regular schedule, may have accounted for its potency in shaping and maintaining selected acts of behavior. Interesting as such speculations are, however, it must be pointed out that the method was designed to measure maternal, rather than infant, behavior.

To look, further, for association between caretaking activities and infant behaviors in the results obtained is tempting but, once again, caution is in order; had differences been found, they could not have been attributed to differences in maternal care alone.

Evaluation of the Method

The results of the study demonstrate that a set of maternal care variables can be specified, defined, and measured. Clear and unequivocal differences in these variables were found in two environments; as a consequence, exact, quantitative statements can now be made about the extent of the differences.

Limitations of the Method. Implicit in the method are characteristics which some might regard as limitations. The presence of the observer is one of these characteristics, and, admittedly, it may alter the mother's usual behavior. Although the observer can by his deportment do much to reduce the extent and the nature of the distortion, this limitation, more generally, will need to be considered afresh for each task set the method. In the present case, for example, there is no reason to believe that all the mothers were similarly stimulated by the observer's presence to give *more* care than they usually did or all the caretakers in the institution to give *less* care. It need only be mentioned in this connection that mechanical recorders may pose still other problems.

It should also be obvious that the measures yielded by the method are discrete and discontinuous; the 14 seconds between the observations are silent. Thus, the method offers no information about the sequence of stimulus and response between mother and infant.

Research Implications. With exact measures of maternal care at hand it should be possible to reproduce, experimentally, environments offering certain kinds and amounts of maternal care, thereby gaining a measure of control.

Without revision the method could be used, also, to answer a number of questions. How does maternal care vary from mother to mother? How does it differ with the socioeconomic status of the home? What are the characteristics of maternal care in different cultures? How does maternal care vary with the age or birth order of the child?

Given only the requirement that the items of behavior and the schedule of observations be defined in advance of measurement, the method will be seen to possess considerable flexibility. In the present study only one of the possible sets of maternal care variables has been used; other sets of variables, for example, one employing finer discriminations of behavior, come to mind.

Finally, it is probably not enough to demonstrate that maternal care can be measured. In the end, the measures will gain validity only to the extent to which they can be shown to enter into predictable relationships with infant behavior.

Summary

The purpose of this paper was to describe a method of measuring maternal care in terms of the actual operations a mother performs in caring for an infant. The method employed the technique of time-sampling, with both the items of behavior to be recorded and the time schedule of observations specified in advance. The method was illustrated by comparing care given three-month-old infants in their own homes with care given in an institution.

On a checklist containing 30 items of mothering activities and 12 items of infant behavior, the observer recorded what both mother (or caretaker) and infant were doing on any second of observation. Observations were made every 15th second for the first 10 minutes of every consecutive quarter hour for a period of eight hours. A record for an infant therefore consisted of 1280 observations systematically distributed over eight hours.

The results showed that the home infants received care 4.5 times as often as infants in an institution; the differences in some specific caretaking operations were even greater. The differences, however, tended to be differences in amounts of caretaking and not in kinds (as defined here). Measures of infant activities, on the other hand, yielded only small and, in general, not reliable differences.

The results demonstrate that a set of maternal care variables can be defined and measured. As a consequence, it may now be possible to formulate and test quantitative statements about the relationships between maternal care and infant behavior.

References

1. Arrington, Ruth E. Time-sampling in social behavior. *Psychol. Bull.*, 1943, 40, 81-124.
2. Bell, R. Q. Retrospective attitude studies of parent-child relations. *Child Develpm.*, 1958, 29, 323-338.
3. Rheingold, Harriet L. The modification of social responsiveness in institutional babies. *Monogr. Soc. Res. Child Develpm.*, 1956, 21, No. 2 (Serial No. 63).
4. Rheingold, Harriet L. A method for measuring maternal care. *Amer. Psychologist*, 1958, 13, 319. (Abstract)

THE STABILITY OF PASSIVE AND DEPENDENT BEHAVIOR FROM CHILDHOOD THROUGH ADULTHOOD[1]

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A basic assumption of developmental theory is that adult behaviors are often established in early childhood. Although retrospective reports obtained from the verbal protocols of adults support this assumption, it has been difficult to produce a more objective demonstration of the long term stability of childhood behavior patterns. This unhappy state of affairs is a consequence of the expense and difficulty associated with collecting long term longitudinal information on a large sample of children. Only extensive, longitudinal research programs, as exemplified by the Berkeley Growth Study or the Fels Research Institute, can furnish the answers to this developmental problem.

This paper presents one set of results which have emerged from a recent study of a group of "normal" adults from the Fels longitudinal research population for whom extensive information was available from birth through adolescence. The findings deal specifically with the long term stability of passive and dependent behavior in the face of situations which are frustrating and/or demand problem solving activity. This particular behavioral variable was chosen for initial analysis because theoretical essays on personality development emphasize that the early dependence of the child on the parent is of the utmost importance in shaping his future personality. That is, the development of a variety of adult motives and behav-

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iors are based on the quality and intensity of the dependent relationship with the mother and mother-substitute figures. Further, psychological symptoms are theoretically attributed to inconsistency in the gratification of the child's dependent overtures and/or to denial or inhibition of dependent motives or behavior.

In addition to the longitudinal material, each subject was recently assessed during early adulthood by means of both interview and test procedures. The adult assessment was focused on the behavioral variables of dependency, aggression, achievement, and sexuality and on the degree of conflict and type of defensive responses associated with behavioral strivings in these areas. It was anticipated that there might be important sex differences with respect to occurrence of these behaviors, and the assessment procedures were designed to detect these potential sex differences.

Method

The Sample

The subjects (*Ss*) in this analysis were 27 male and 27 female Caucasian adults born between 1930 and 1939 who had recently been through a comprehensive assessment program which included an average of five hours of tape recorded interview and a variety of test procedures. The *Ss* were between 20 and 29 years of age at the time of the assessment. In addition, these *Ss* had fairly complete longitudinal records from 3 to 10 years of age. The *Ss* were predominantly middle class but came from a variety of vocational backgrounds including agricultural, skilled labor, tradesmen, and professional groups. The religious affiliations of the group included 43 Protestants, 10 Catholics and 1 Jewish subject. The mean Wechsler-Bellevue IQ of the group was 120 with an IQ range of 97 to 142.

Interview Variables: Adult Assessment

Each *S* was interviewed by the senior author for approximately five hours over two to three sessions. *The interviewer had absolutely no knowledge of any of the longitudinal information on the Ss.* Since these *Ss* had been studied by psychologists for over 20 years, rapport was usually excellent, and defensive and evasive answers were infrequent. Following the interviews, each *S* was rated (7-point scale) on 59 variables. Six of these adult interview variables dealt specifically with passive and dependent behavior; abridged definitions of these variables follow:

Degree to which dependent gratifications were sought in choice of vocation. This variable assessed the degree to which security was an important aspect of job choice, the degree to which the subject looked to his employer for gratification of his dependent needs, reluctance to shift jobs because of temporary loss of security. For nonworking women, emphasis was placed on her attitudes about the importance of security in her husband's job.

Degree of dependent behavior toward a love object. This variable assessed the degree to which the subject sought advice and emotional support from a love object (sweetheart, husband, wife), degree to which the subject

looked for stability and wisdom in a love object, degree to which responsibility for decision making was given to love object.

Degree of dependent behavior with parents. This variable assessed the degree to which the subject looked for advice, support, emotional encouragement, and nurturance from one or both parents.

Degree of dependent behavior toward nonparental figures. This variable assessed the degree to which the subject sought advice, emotional support, and nurturance from nonparental figures who were not love objects, e.g., friends, relatives, and teachers.

Tendency to display behavioral withdrawal in the face of anticipated failure. This variable assessed the frequency and consistency with which *S* tended to withdraw from tasks and situations which he thought were difficult to master and in which failure was anticipated.

Degree of conflict over dependent behavior. This variable assessed the degree to which the subject avoided placing himself in dependent positions, his derogation of dependent behavior in self and others, and his emphasis on the value and importance of independent behavior.

A random sample of 32 taped interviews were independently studied and rated. The interrater reliabilities for the six dependency variables ranged from .63 to .82 with an average coefficient of .74.

Procedure for Evaluation of Childhood Behavior

The junior author, who had no knowledge of the adult psychological status of the *S*s, evaluated narrative reports based on direct observation of the child in a variety of situations. Summaries of interviews with the child and the mothers were also available. The observation reports were based on (a) semiannual visits to the home in which a staff member observed the child interact with mother and siblings for a two to four hour period, (b) semiannual or annual observations of the child in the Fels experimental nursery school and day camp settings, (c) interviews with the child, and (d) observations of the child in the classroom. After studying this material, the psychologist rated each child for a comprehensive set of variables (7-point scale). The rater studied the material for each *S* for ages 3 to 6 and made his ratings. Following a period of interpolated work, he then studied all the material for each *S* for ages 6 to 10 and again made the ratings. A period of approximately six months intervened between the evaluation of the material for any one child for ages 3 to 6 and 6 to 10. The rater felt that retroactive inhibition was sufficiently intense to mask any halo effect of the preschool ratings upon the later ratings made for 6 to 10 years of age. That is, the amount of material studied and the large number of variables rated militated against the recall of specific ratings over such a long period of time. In addition, the high degree of interrater reliability for these ratings supports the above statement. Independent ratings of the four childhood dependency variables by a second psychologist produced satisfactory interrater reliabilities. The product-moment correlations for each variable were all in the .80's with an average reliability of .86. The four childhood variables which involved passive and dependent behavior were defined as follows:

Tendency to behave in a passive manner when faced with environmental obstacles or stress (rated for ages 3 to 6 and 6 to 10). This variable assessed the degree to which the child was behaviorally passive in the face of external frustrations and failed to make any active mastery attempts to obtain desired goal objects following frustration. The rating of a passive behavioral reaction emphasized withdrawal from the frustration but included whining, crying, and soliciting help.

Tendency to seek support, nurturance, and assistance from female adults when under stress: general dependence (rated for age 3 to 6). This variable assessed the *S*'s behavioral tendency to obtain assistance, nurturance, or affection from mother and other female adults when confronted with a threat to his well-being, a problem, or loss of a desired goal object. Dependent behavior included seeking out adults when faced with a problem or personal injury, reluctance to start a task without help or encouragement, seeking assistance of others, seeking affection from and close contact with female adults.

Tendency to seek affection and emotional support from female adults (rated for ages 6 to 10). This variable assessed the degree to which the child sought affection or emotional encouragement from mother or mother substitute figures. Evidence included kissing, holding hands, clinging, seeking encouragement or proximity to female adults.

Tendency to seek instrumental assistance from female adults (rated for ages 6 to 10). This variable assessed the degree to which the child sought instrumental help with specific problems from mother, teachers, or other female authority figures. Instrumental dependent acts included seeking help with tasks, seeking help when physically threatened.

As mentioned above the average interrater reliability for these four variables was +.86.

The distributions for both the childhood and interview variables were normal. Product-moment correlations were computed between each of the childhood variables and the six interview based dependency variables obtained in adulthood with separate analyses for males and females.

Tachistoscopic Perception

After the interviews and interview ratings were completed, each adult *S* was seen for a variety of test procedures, one of which was a tachistoscopic perception task. A series of 14 scenes were drawn to suggest action in the areas of dependency, aggression, sexuality, and physical danger. Three motivationally neutral, control pictures were also included.[2] For nine of the 14 pictures, separate pairs of illustrations were made for males and females so that the sex of the central figure was the same as the sex of the subject. The pictures were black and white line drawings with minimal background details. A brief description of the three dependency pictures follows:

1. A young adult in the foreground (male for male *Ss* and female for female *Ss*) is on his knees clutching to the waist of a figure of the same age but of opposite sex who is standing and looking forward. The figure on the floor is looking up at the face of the standing figure.

[2] Photostats of the 14 stimuli are available upon request.

2. A young adult in the foreground (male for male *Ss* and female for female *Ss*) has his arms extended in an imploring gesture toward an adult of the same sex who is standing in the background with his back to the figure in the foreground.

3. A young adult (male for male *Ss* and female for female *Ss*) is seated on a chair with head buried in the abdomen of an adult of the opposite sex who is standing and comforting the seated figure.

The 14 pictures were presented seven times at seven different exposure speeds and in six different orders. The seven speeds ranged from .01 to 1.0 seconds. The pictures were shown initially at the fastest exposure (.01 second), and each succeeding series was presented at a slower exposure speed. All exposures were above threshold and all *Ss* reported seeing something at each exposure. The *S* sat in a light proof room, 22 in. from a flash-opal milk glass screen. The image was projected from the back of the screen, and the field was constantly illuminated by a 35 mm. projector (30 ft.-candles at the screen). The subject was told to state for each picture (a) the sex of each figure, (b) the approximate ages of each figure, and (c) what each figure on the picture was doing. The *S* was given three practice pictures to adapt him to the task and its requirements, and the entire protocol was electrically recorded and transcribed verbatim.

The protocols were scored for recognition threshold for each picture. Recognition threshold was defined as the first series at which the picture was described accurately and all succeeding trials were accurately described. The distribution of recognition thresholds differed among the 14 pictures and were markedly skewed either to the low or high end of the scale. Thus, the distribution of recognition thresholds for each picture was divided at the median into early and late recognition groups for statistical operations.

Results

Stability of Dependent Behavior

Table 1 presents the product-moment correlations between the childhood and adult ratings of passive and dependent behavior.

The major result is that passive and dependent behaviors were fairly stable for females but not for males. For girls the ratings of passivity during ages 6 to 10 correlated significantly with the adult ratings of a dependent orientation in vocational choice, dependency on love object, dependency on parents, and withdrawal to failure. Childhood passivity was inversely correlated with adult conflict over dependent behavior. That is, females who were passive as children were apt to accept their dependent behavior in adulthood and show minimal anxiety over their dependent motives. Only dependent behavior toward nonparental figures failed to show a significant, positive correlation with the childhood ratings of passivity. Similarly, the childhood ratings of both instrumental and emotional dependency on female adults, for girls aged 6-10, predicted adult ratings of dependency

TABLE 1

CORRELATIONS BETWEEN PASSIVE-DEPENDENT BEHAVIOR IN CHILDHOOD AND ADULTHOOD

	ADULT DEPENDENCY VARIABLES											
	Dependency in Vocation		*Dependency on Love Object*		*Dependency on Parents*		*Dependency on Others*		*Withdrawal to Failure*		*Dependency Conflict*	
Childhood Variables	*M*	*F*	*M*	*F*	*M*	*F*	*M*	*F*	*M*	*F*	*M*	*F*
Passivity (Ages 3 to 6)	−.07	.24	.10	.23	−.28	.25	.04	.19	.06	.26	.03	.01
Passivity (Ages 6 to 10)	.11	.73**	.25	.36*	−.20	.54**	.04	.06	.21	.52**	−.26	−.63**
General Dependence (Ages 3 to 6)	−.06	.21	.13	.20	−.07	.07	.11	−.06	.12	.00	.05	.26
Emotional Dependence (Ages 6 to 10)	.21	.08	.18	.37*	.02	.51**	−.02	.06	.35*	.37*	−.12	−.31
Instrumental Dependence (Ages 6 to 10)	.19	.39*	.06	.58**	.14	.32	.37*	.01	.09	.39*	−.04	−.17

* $p < .05$, one tail.
** $p < .01$, one tail.

on love object, dependency on parents, and withdrawal to anticipated failure situations.

For the men there were only two significant correlations between the childhood dependency ratings and those based on the adult interview. Boys who were high on instrumental dependency for ages 6 to 10 were high on dependent behavior towards nonparental figures in adulthood. Second, emotional dependence during ages 6 to 10 was positively correlated with adult withdrawal to failure.

Of the 18 correlations between each of the three childhood variables for ages 6 to 10 and the six adult variables, 60 per cent were significant in the expected direction for females, while only 9 per cent were significant for the men.

Tables 2 and 3 present the intercorrelations among the childhood and adult interview variables respectively.

The correlations among the passive and dependency variables between ages 3 to 6 and 6 to 10 were generally more consistent for girls than for boys. That is, for girls the correlations among passivity and general dependence for ages 3 to 6 and the three variables for ages 6 to 10 were all consistently high. For boys the stability of the passivity rating for ages 3 to 6 and 6 to 10 was quite high. However, the relationships between passivity for 3 to 6 and the two dependency behaviors for 6 to 10 were not as high as they were for girls. This finding suggests that overt seeking

TABLE 2

INTERCORRELATIONS AMONG CHILDHOOD DEPENDENCY VARIABLES

	Passivity (6 to 10)		*Gen. Dep.* (3 to 6)		*Emot. Dep.* (6 to 10)		*Instr. Dep.* (6 to 10)	
	M	*F*	*M*	*F*	*M*	*F*	*M*	*F*
Passivity (3 to 6)	.82**	.76**	.74**	.83**	.26	.80**	.38	.79**
Passivity (6 to 10)	..	..	.40*	.63**	.43*	.65**	.53**	.61**
General Dependence (3 to 6)	..	..	..	..	.37	.61**	.38*	.63**
Emotional Dependence (6 to 10)	..	..	..	..	..	..	.60**	.79**
Instrumental Dependence (6 to 10)	..	..	..	..	..	..	..	..

* $p < .05$, two tails.
** $p < .01$, two tails.

of affection and/or instrumental aid in school age boys begins to be dissociated from a passive withdrawal reaction to problem situations.

The intercorrelations among the adult dependency variables were generally positive for both sexes. Dependency on parents and dependency on love objects were each associated with withdrawal to failure and negatively related to conflict over dependency. It is interesting to note that women who are dependent on their parents tended to be dependent on their love object but not on friends or authority figures. Men, on the other hand, who were dependent on their parents tended to be dependent on friends and authority figures rather than on a love object. Dependency on parents and friends usually involves instrumental aid with problems, while dependency on a love object more often included the soliciting of emotional support and affection. It will be recalled that one of the two significant correlations for

TABLE 3

INTERCORRELATIONS AMONG ADULT DEPENDENCY VARIABLES

	Dependence Love Object		*Dependence Parents*		*Dependence Others*		*Withdrawal*		*Dependence Conflict*	
	M	*F*	*M*	*F*	*M*	*F*	*M*	*F*	*M*	*F*
Dep. Vocation	.61**	.42*	.53**	.49**	.12	−.10	.41*	.50**	−.61**	−.56**
Dep. Love Object	..	..	.24	.54**	.48**	.16	.49**	.54**	−.66**	−.50**
Dep. Parents	..	..	..	..	.39*	.03	.44**	.57**	−.59**	−.71**
Dep. Others	..	..	..	..	..	..	.38*	−.15	−.46**	.15
Withdrawal	..	..	..	..	..	..	..	..	−.57**	−.70**
Dep. Conflict	..	..	..	..	..	..	..	..	..	..

* $p < .05$, two tails.
** $p < .01$, two tails.

males between childhood and adult dependency involved instrumental dependency for ages 6 to 10 with adult dependency on nonparental author*ity figures. Emotional dependency for boys age 6 to 10 showed no corre*lations with the adult dependency variables. Thus, male dependent behavior *is apt to emphasize the seeking of instrumental assistance with problems,* while females are likely to seek affection and emotional support in addition to instrumental aid.

It is important to note that passive and dependent behavior for ages 6 to 10 showed a better relation to adult dependent behavior than the ratings for 3 to 6 years of age. This finding indicates that important age changes occur between ages 3 and 10 and that behavior displayed during the first few years of school is a better index of adult functioning than the earlier preschool behavior patterns.

Tachistoscopic Perception of Dependent Pictures

There were significant sex differences in recognition threshold for the three dependency pictures with the females recognizing all three pictures earlier than the males. The scene that depicted a person imploring a same sexed adult (picture 2) yielded the most significant sex difference ($p < .001$, two tails). The picture of the adult on his knees clutching on to an opposite sexed adult (picture 1) and that of the seated adult holding on to an opposite sexed adult (picture 3) yielded sex differences significant at the .005 and .08 levels, respectively, for two tails. The aggressive pictures, on the other hand, produced opposite results, for the females recognized two of the four aggression pictures significantly later than the men ($p < .01$, two tails). There were no significant sex differences for the sex, physical danger, or three neutral scenes.

There was not a highly consistent relationship between recognition threshold for the dependent scenes and the interview ratings of dependency conflict. Only recognition of the scene that illustrated a man on his knees in front of a woman (picture 1) showed a relation to dependency conflict, and this held only for males. The males who were above the median in recognition threshold for this scene (late recognition) were rated as more conflicted over dependent behavior than males who recognized this picture early ($p = .07$, two tails). For the females, recognition threshold for the dependency pictures showed no significant relation to ratings of dependency conflict.

Discussion

The results support a basic hypothesis of developmental theory which states that the acquisition of certain adult response patterns begins in early childhood. The differential stability of passive-dependent behavior for men and women is probably the result of several factors. However, one set of processes which may contribute to this phenomenon is derived from the commonly accepted hypothesis that passive and dependent behavior is less

punished in females than in males. Further, females are often encouraged to be passive while men are expected to be independent and autonomous in the face of frustration. Parental and peer group punishment for passive and dependent behavior should result in some inhibition of this behavior in males. Thus, we would not expect this class of behavior to be as stable for men as for women. Studies of both overt behavior and fantasy (2, 3, 4, 6, 7) all indicate that dependent responses are more frequent for girls than for boys. Further, the sex stereotypes presented by communication media fit this description. The analysis of children's books by Child, Potter, and Levine (1) indicated that girls are portrayed as passive while boys are presented as independent and heroic. Finally, a study of the likes and dislikes of 10-year-old children (5) confirms the belief that girls accept passive behavior as more appropriate for their sex role than do boys.

The present tachistoscopic threshold data support the notion that men are more conflicted over dependent behavior than women. It will be recalled that the women recognized all three scenes depicting dependent behavior much earlier than the men. This finding suggests that the tendency to perceive dependent behavior in adults is much weaker in men than it is in women. One possible cause of this "weaker perceptual hypothesis" is that dependent action is less acceptable to men, i.e., that men are more conflicted over dependent behavior. This conclusion finds support in the correlation, for men, between late recognition of dependency (picture 1) and the interview rating of dependency conflict.

Detailed analysis of the 54 cases indicates that there was a greater proportion of men, than women, who shifted from high dependency during childhood to independent behavior as adults. The women tended to be either dependent or independent for both childhood and adulthood. For example, in comparing emotional dependence for ages 6 to 10 with adult dependency on parents, not one female showed a major shift from high dependency in childhood to low dependency in adulthood. For the men, however, 20 per cent were rated very dependent during the ages 6 to 10 and very independent in adulthood.

The authors do not suggest that passive and dependent behavior in girls is rigidly fixed at school age and that change is a rare or unusual phenomenon. It must be kept in mind that the social milieu of these particular subjects remained rather constant throughout their lives. Their familial and extrafamilial environments were not disrupted to any marked degree. The parents and peers of these *Ss* retained their same values, their reference groups remained constant, and, in most cases, their geographical travel was limited. Thus, the degree of behavioral stability obtained for these females might not hold for populations that are more mobile or transient, for different ethnic or class samples, or for people subjected to major traumata during adolescence and early adulthood.

Implicit in these results is a strategy for certain research problems in developmental psychology. It would appear that a select group of theoret-

ically relevant behaviors become clearly established as preferential response tendencies as early as 6 to 10 years of age. This means that one can study the child longitudinally without having to wait 15 to 20 years before asking important questions of the data. Since the current philosophy of financial support for research allows an investigator to chart a 5 to 10 year program, it is now feasible for one investigator to see the products of a longitudinally oriented project in a reasonble length of time.

Although case history material can never prove an hypothesis, it often facilitates scientific communication by placing some flesh on the skeleton of a correlation matrix. The following case material is presented to give the reader a clearer picture of the material upon which our childhood evaluations were based and to illustrate dramatically the degree of constancy of behavioral passivity for two specific individuals.

Case A. Miss A is a 21-year-old, unmarried woman, who was in her senior year in an Eastern college. She was one of the most independent women in our sample and one who showed a strong reaction against dependent behavior in a wide variety of situations. As an adult she was described as a woman with a very strong need for recognition by others combined with a striving for achievement related goals. She had a strong desire to nurture others and often sought out situations in which she could give advice, support, and encouragement to peers. Miss A stated during the interview that she liked to keep her personal problems to herself. She did not like to discuss her personal problems because she felt that this behavior made her appear "helpless and weak." Statements like this indicate very strong conflict and anxiety over being in a passive-dependent position with other people. She was trying to sever any semblance of a dependent relation with her mother and derogated the latter because the mother seemed to be dependent upon her for companionship. Miss A sometimes felt lonely but said that she fights these feelings and tries to be able to live with them, for she does not like to admit that she needs friends or companionship. Her relationship with men seems to be consistent with the above pattern, for she tends to withdraw from heterosexual relationships that become too intense. Miss A said that she does not like men that make demands upon her, and she avoids men who attempt to place her in a passive role or position.

The following material represents selected verbatim excerpts from the longitudinal material on this subject.

> *Age 3 years, 4 months: Summary of Fels Nursery School Observations. S* seems to be able to control and channel her behavior so that she got done just what she wanted to get done. In this activity she was very independent and capable. She was very social but also had a streak of aloof self-sufficiency, and she always made her individuality felt. She was what might be called a strong personality, often very intense, quite stubborn. . . . Her most outstanding characteristic was her consistent independence and integrity. In spite of the fact that she imitated and followed certain boys, she seemed to do this very much from her own choice, and she never lost the flavor of

her individuality. She was capable of being social and seemed to enjoy contacts but at all times she was her own master. She would often withdraw from play and go on in her own direction at any time that she wished. . . . She was independent with adults and at times negativistic just to be devilish. She seemed somewhat self-conscious and had some cute little tricks. . . . In all, she could be characterized best by being called "tough minded." She shows determination and will, originality and spark, curiosity and interest in factual detail. She likes to quibble and argue, to verbalize, to construct, to accomplish. She is an individualist, independent and stubborn.

Age 5 years, 4 months: Fels Nursery School Observation. *S* seems to be vigorous, ruthless, competitive, highly sensual young woman, but one felt quite often that antagonism toward others was simply a direct response to their behavior. . . . She has grown far more social and also popular with an increasingly large crowd of special friends in a gang. She could be, when she chose, quite a successful leader, forging ahead and organizing a group on a hike, directing them and arranging things, and particularly keeping order in a fair sharing of the tools in the carpentry shop. . . . Many of *S*'s conflicts with the adult world seemed a direct imitation of a certain boy. She needed a chance to grumble, would scornfully refuse any adult suggestions or orders, would usually go officially ahead to carry them out. She was quite demanding, often shouting an order to an assistant. . . . With her other work the same drive for strong achievement was also evident, sticking to anything until it was finished, whatever the group stimuli. *S* still had real trouble in fine motor coordination, would growl as she worked, "I'm doing this as well as I can steer my pencil." For all her teeth gritted effort, the final results would still be relatively crude. She was very skilled in the use of puzzles and interested in the problems of designs and the way things fit together. She scorned any of the ready-made designs for the Christmas tree decorations.

Age 7 years: Observation in Fels Day Camp. *S* came accompanied by one friend. *S* did not seem overwhelmed by the large proportion of adults around, but in her sturdy self-sufficient manner went ahead with her own activities. Her friend was at first rather shy and withdrawn and *S*, with her usual confident bullying and bossing of the adults, tended to take the girl under her wing and make sure she had a good time. *S* remains an exceptionally eager, imperturbable young woman. On a number of small issues she did insist on her own way, on just how long she would stay in the gym and play before lunch, but was quite reasonable about making compromises. She chose a rather difficult necklace to make and got quite mad when it didn't work out well. She kept doggedly with it, very self-sufficient, and continuing all on her own after getting some initial advice. . . . Her major effort was put on self-appointed tasks, to be able to master jumping over the horse at the gym where she took numerous tumbles until she succeeded. In spite of her distractability and preference for the apparatus she did set herself to learning the new skills required there.

Age 9 years: Report from Teacher. *S* is one of the most responsible children in the group. . . . She is self-reliant, independent, and knows how to plan her time well. She enters all games with enthusiasm, is very well coordinated, is full of personality and "joie de vivre."

Case B. Miss B is a 23-year-old, unmarried woman, who is working and living with her parents. She was one of the most overtly dependent women in the sample. During the interview she was very dependent on the interviewer for structure and was rather mild and meek. Her most typical

reaction to failure or stressful situations is to deny or withdraw and she says quite blithely, "I'm not a worrier." She is very sensitive to the opinions of other people and usually conforms with their expectations for her. She accepts her passive-dependent role with authority people and with love objects. *S* tends to be very dependent on peers for advice, likes being close to the family, and tends to see herself as inadequate in the face of problem situations.

Following are selected excerpts from her longitudinal records:

Age 2 years, 6 months: Fels Nursery School Observation. At the first day of nursery school, *S* seemed rather frightened and very reluctant to leave her mother this morning. The mother had to carry her and hold her in the car until the door was shut. For the first few miles she cried and then suddenly stopped and began to take an interest in the various animals and objects. She cried when she reached the nursery school but stopped as soon as she left the other children. On the second day of nursery school she cried again but seemed much less frightened and more angry. During the nursery school she stood watching the other children and at one point ran to another girl and stood beside her. The other little girl paid no attention, and *S* trailed after her. *S* wandered around and, when the teacher went to the house, *S* rushed to follow her and stood around the teacher. *S* tagged after another little girl all morning. During the nursery school two-week period she was timid and tense.

Age 3 years: Fels Nursery School Summary. At first, *S* was timid and tense and was gathered under the wing of another peer and her cohorts. From then on she was "at home" with the group. She followed another girl's lead and joined in the activities the other girl organized. On days when this girl was absent she was at loose-ends and tended to return to her original dependence on an adult. Several weeks after her nursery school stay she visited the school one morning for several hours. She was a little apprehensive at first but made no real protest. She stood around not joining in the play until an adult suggested an activity.

Age 4 years: Fels Nursery School Summary. *S* cried the first day of nursery school after she saw another girl cry. She stayed close to the teacher the first few days and watched the other children with a worried expression on her face. Indoors she chose small blocks or color cubes to play with. In the yard *S* was very cautious about trying out the apparatus, particularly when there was any balancing involved. She has a high, whining nasal voice, and several letter substitutions made her speech rather difficult to understand. She was quite complying with adult requests. Frequently, she appealed to adults for help in conflicts, such as getting a turn to slide, which is a situation she could have handled for herself.

Age 6 years: Visit to the School. *S* is retiring, quiet, and shy. She doesn't show the enthusiasm that most of the children in the class do. She seems content. . . . She goes to the teacher for suggestions and skips to her seat jubilantly with a word of approval from the teacher. *S* recites a bit timidly in front of the whole class but accepts the teacher's support and gets through successfully. Her voice is a little soft and her enunciation is not clear. *S* volunteers information a bit tentatively and without enthusiasm. The teacher reports that *S* is about the brightest of the average group. *S* is not a leader but she is very sweet and cooperative and is never any trouble.

Age 6 years, 6 months: Summary of Fels Day Camp Observations. *S* was outclassed in almost every respect in this group but fluttered happily about

after the others doing the best she could. She occasionally withdrew or grew silent but, when encouraged by an adult, she soon recovered. She was not insensitive and did not seem to have her security disturbed more than momentarily. She seems to feel a great confidence and trust in adults and could always be bought off or led along. She lacked initiative in almost every way. She could not go ahead on any craft project nor could she assert herself socially. She needed help and encouragement, hung about the adults, not exposing herself to the center of the group. She is essentially a conformist and wanted only to do what was right. She got into no mischief and had little sense of fun. She was happiest when settled into a situation that was approved and guided by an adult, and at these times she would proddle along very happily. Her main interests lay in conforming to any plans laid by adults and working on simple handcrafts. She was rather unsure in her accomplishments. She was often physically apprehensive.

Age 7 years, 6 months: Summary of Fels Day Camp Observations. The most characteristic aspect of *S*'s day camp behavior was her ability, high conformity, and social reticence. She did not participate in social activities to any extent and was generally ignored by the other children. She clung to adults, wanted to assist them when possible, and wanted their approval and comforting in all her activities. She seemed to be somewhat apprehensive of physical contacts, especially if they became at all rough. She was apprehensive about almost any physical danger. Her actual physical ability was not particularly poor, and, when she was put into athletic situations, she did surprisingly well. Her general lack of physical participation seems not to be due to poor ability as much as to lack of motivation and apprehension.

Age 8 years: Visit to the School. *S* is always anxious to do what is right all of the time. She is not a discipline problem. *S* shows no interest in physical activities. Initially, she is lost at school work and takes some time to adjust to new work. *S* was pretty tentative in her first attempt to get the teacher's attention and held up her paper hesitantly. She was very pleased when the teacher came to her. She was uncertain about the problems although they had similar ones before.

Age 8 years, 8 months: Fels Day Camp Summary. *S* is a small, dark looking girl, bent over, with thick dark hair and a tired face. Her voice is high but with no force; her hands hanging limp at the wrists. Much of this lack of force seemed related to her personality, and at the races she surprised us by doing remarkably well. *S* obeyed adults implicitly and wanted to have their sanction for even small acts which the group had already been given permission for. She has a rather cringing, servile manner. This clinging around adults was particularly marked the first day when she ate her lunch with them.

Age 9 years, 8 months: Fels Day Camp Summary. *S* is a rather pathetic looking little girl. Rather thin, droopy eyed, clammy handed, somehow reminiscent of an orphan in an old melodrama. She seems nearer to seven or eight than her actual age and with a kind of naivete and unsureness about all she did. She was an exceedingly compliant child in taking the tests, even the reading tests which she obviously disliked, without a murmur.

Summary

This paper summarized some results from a larger investigation of the stability of behavior in a group of subjects who were part of the Fels Research Institute's longitudinal population. This report dealt specifically with

the long term stability of passive and dependent behavior from childhood through adulthood.

The *Ss* were 27 males and 27 females for whom extensive longitudinal information was available from birth through adolescence. One psychologist studied narrative reports based on observations of the child in various settings and rated each child on four variables describing types of passive and dependent behavior for ages 3 to 6 and ages 6 to 10. A second psychologist, who had no knowledge of the childhood data, interviewed each *S* in adulthood and rated each *S* on six variables related to aspects of adult passive and dependent behavior. In addition, each adult *S* was administered a tachistoscopic perception task in which scenes illustrating dependent activity were presented at seven different exposure speeds.

The results revealed that passive and dependent behaviors were quite stable for women, but minimally stable for men. Over 60 per cent of the correlations between the childhood (ages 6 to 10) and adult ratings of dependency were statistically significant for females, while only 9 per cent were significant for men. For example, the correlation between passive withdrawal from problem situations for ages 6 to 10 and adulthood was .52 ($p < .01$) for women and .21 for men. Similarly, the correlation between emotional dependence for ages 6 to 10 and adult dependency on parents was .51 ($p < .01$) for women and .02 for men. The correlations between the ratings for ages 3 to 6 and adulthood were considerably lower and not statistically significant.

It was suggested that environmental disapproval and punishment of dependent behavior in young males led to inhibition of and conflict over dependency in the growing boy. The social acceptance of passive and dependent behavior in females would be expected to result in greater stability for this class of responses for women than for men. The fact that females recognized the tachistoscopically presented dependency scenes earlier than the men was interpreted as support for this explanation.

Case history material for two female subjects was presented to illustrate the type of information utilized in this study.

References

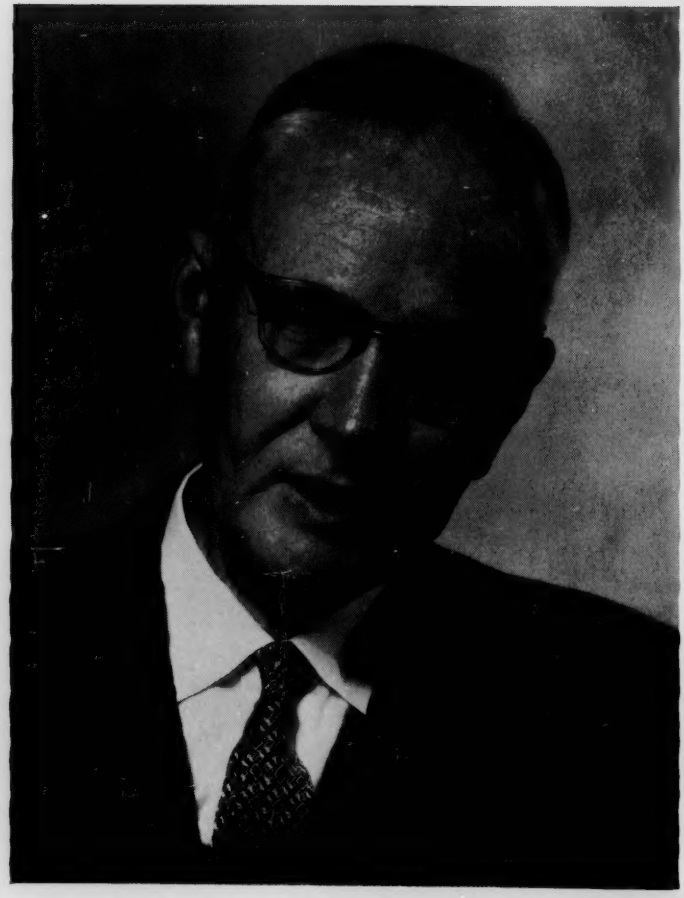
1. Child, I. L., Potter, E. H., & Levine, Estelle M. Children's textbooks and personality development: an exploration in the social psychology of education. *Psychol. Monogr.*, 1946, 60, No. 279.
2. Hattwick, Bertha. Sex differences in behavior of nursery school children. *Child Develpm.*, 1937, 8, 323-355.
3. Kagan, J. The stability of TAT fantasy and stimulus ambiguity. *J. consult. Psychol.*, 1959, 23, 266-271.

4. Sanford, R. N., Adkins, M. M., Miller, R. B., & Cobb, E. N. Physique, personality and scholarship: a comprehensive study of school children. *Monogr. Soc. Res. Child Develpm.*, 1943, 8, No. 1.

5. Tyler, Leona E. The development of vocational interests. I. The organization of likes and dislikes in ten year old children. *J. genet. Psychol.*, 1955, 86, 33-44.

6. Watson, R. I. *Psychology of the child*. New York: Wiley, 1959.

7. Whitehouse, Elizabeth. Norms for certain aspects of the Thematic Apperception Test on a group of nine and ten year old children. *J. Pers.*, 1949, 1, 12-15.



Harold E. Jones

HAROLD ELLIS JONES

1894 - 1960

Harold Ellis Jones was born on December 3, 1894, in New Brunswick, New Jersey. He was the son of Elisha Adams Jones and Lessie E. Brown Jones, natives of Massachusetts, who came from a long line of New Englanders. It was always a matter of some regret for Harold that he had to put down New Jersey as the state of his birth when he really felt that he belonged to New England. It happened that his father held a position at Rutgers University at the time of his birth. In his infancy the family returned to Massachusetts and took up residence in Amherst. Later they moved to New Canaan, Connecticut, where Harold (taught much at home because of early illnesses) was prepared for the public high school in Stamford, Connecticut. He was graduated there as president of the class, an honor student, editor of the school monthly, and was voted by his classmates as having "done most for the school."

He entered the Massachusetts Agricultural College in 1914. His father had been manager of the Experimental Farm at the College, and it was probably under his influence that Harold started college with the intention of specializing in biology. But Harold's mother thought that he should have a liberal education, and this was no doubt a major factor in his decision to transfer to Amherst College at the beginning of his junior year. Alexander Meiklejohn was president of Amherst at the time, and Robert Frost and Stark Young were members of the faculty. All three of these men were interested in Harold and influenced his development. Here, no doubt, we find some of the sources of Harold's remarkably lucid and graceful literary style. Harold Jones' writing has always been so clear, so like a mirror that

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shows us the object or content without distortion, that his style has often escaped notice and his writing has seemed to have been produced effortlessly. But we know that Harold labored over his style, devoting to his own writing the same care that he always gave to things which he was called upon to edit. Many people have had the experience of handing a paper to Harold Jones with the complete confidence that, if he approved, it was all right, and that, if it was not all right, he would soon fix it so that it was.

Undoubtedly the Amherst education contributed much to our conception of Harold Jones as a scholar and gentleman of the old school, a man whose broad education gave the basis not only for a great diversity of interests but for a knowledge of the world and of how to make value judgments about it.

Harold was graduated Magna cum laude and Phi Beta Kappa from Amherst, with a major in biology, in 1918. He spent that summer at the Institute of Marine Biology at Wood's Hole, Massachusetts, and then returned to Amherst to spend a year as an assistant in biology. The next year, 1919, he and Mary Cover appeared at Columbia University as graduate students in psychology. We do not know just when and in what circumstances Harold turned from biology to psychology. He was offered a job with Knight Dunlap at Johns Hopkins in the fall of 1919, and it may well be that what Dunlap had in mind was something on the borders of biology and psychology. The job with Dunlap fell through at the last minute, and then Harold went to Columbia to study psychology. Harold and Mary, both students in psychology at Columbia, actually met at the New School for Social Research, where both took a course in history with James Harvey Robinson. Harold had taken special notice of Mary at Columbia, and he wanted to meet a fellow psychology student who was also interested in history, so he introduced himself. This event was probably one of the most significant in his life. Not only did it lead to a happy and generative marriage, but it was determining with respect to Harold's professional career. At Columbia, Harold was interested in experimental psychology. He became Woodworth's assistant, and he began teaching experimental psychology before he received his Ph.D. degree. As had been the case at Amherst, he had the benefits of a very personal relationship with an admired professor. He and Woodworth went on camping trips together, and we may be sure that they talked not only about psychology but about the manifold aspects of the nature around them. But having met Mary, Harold's fate was sealed. She was a Rockefeller Fellow and was conducting a study of infant behavior. It was a little later, under the auspices of the Hecksher Foundation, that Mary, with Harold's encouragement, conducted her famous investigations of children's fears. Harold became interested in this kind of work. We can well imagine that he saw in it a chance to combine his deep and persistent interest in biological and hereditary factors, as determinants of behavior, and his interest in learning, which had been highly developed in Woodworth's laboratory.

Harold Jones took his Ph.D. at Columbia in 1923 and remained there as instructor and assistant professor until 1927. He taught physiological, experimental, and general psychology. He and Mary were married, by Norman Thomas, in 1920. Their daughter Barbara (Mrs. Kenneth Coates of Portland, Oregon) was born in 1922, and Lesley (Mrs. Alec Alexander of Santa Barbara, California) in 1925. There are six grandchildren.

Jones' early publications during his years at Columbia were experimental studies of learning, but after meeting Mary he became increasingly interested in the study of child development. It was through his participation in the studies begun by Mary Jones that he met Lawrence Frank, Director of the Laura Spellman Fund. Mr. Frank, at that time, was arranging for the establishment of an Institute of Child Welfare at the University of California, Berkeley, and it was through him that Jones was invited to come to Berkeley as Assistant Professor of Psychology and Director of Research at the Institute of Child Welfare. Dr. Herbert R. Stolz was the first Director of the Institute.

The move to Berkeley marks the beginning of a period of 33 years during which Harold Jones contributed widely and deeply to developmental psychology. He became Professor of Psychology in 1931 and Director of the Institute in 1935. He is perhaps best known in this country and abroad for his work in building up the Institute of Child Welfare from small beginnings to a research organization representing a great diversity of academic disciplines, of interests, and of points of view. The Institute is closely associated in most people's minds with the three growth studies which Jones started before 1932 and which are still in progress. His own research during this period was concentrated in the field of developmental psychology; it ranged over a wide area of problems and touched all the major phases of the life cycle—infancy, childhood, adolescence, maturity, and old age. Out of this work came the bulk of his 150 publications in scientific journals. For many years Jones taught the basic undergraduate courses in developmental psychology, while directing the graduate work of many students who were later to make their mark in this field. He was chairman of the University's Group in Child Development, which offered both undergraduate and graduate programs. As a teacher and as a spokesman for developmental psychology, and as an interpreter of research results in the field, Jones did not limit himself to the University, but accepted numerous invitations to speak and lecture before groups in the larger community. He became known in the Bay Area, throughout California, and in the world as a dependable source of the latest findings concerning children, adolescents, and, later, the aging. At the same time, Jones was intensively occupied with editorial work, being at one time or another during his Berkeley period on the editorial board of seven professional journals and an editorial consultant for five others. As a senior professor, his services were desired increasingly by the University, and he gave much time to work on faculty committees of high responsibility. At the same time, his counsel was sought

by numerous national and international organizations and committees. The projects which he served as consultant were of great diversity, reflecting the breadth of his interests, but they were almost always related to developmental psychology. Thus, Jones was consulted on elementary education, the education of teachers, graduate education, educational television, the exceptional child, delinquency, prejudice, adoption, and numerous other problems, in addition to those arising from within the field of developmental psychology itself.

Jones was a charter member of the Society for Research in Child Development, a member of its Governing Council from 1940 to 1945, and president in 1952-1953. He held numerous elective offices in the American Psychological Association, including membership on the Board of Directors, and the presidency of three Divisions: the Division of Educational Psychology, 1946-1947; the Division of Developmental Psychology, 1947-1948; and the Division of Maturity and Old Age, 1951-1952. He was president of the Western Psychological Association in 1935-1936, president of the Western Gerontological Society in 1959-1960, and a member of the Council of Directors of the National Gerontological Society in 1958-1960. He served the National Research Council in various capacities during the period 1941-1951 and was closely associated with the Social Science Research Council over a period of some 15 years, being a member of the Board of Directors from 1943-1946 and Pacific Coast representative from 1946-1956. He was active in the affairs of the American Association for the Advancement of Science, the American Orthopsychiatric Association, the National Society for the Study of Education, the Pacific Sociological Society, and the American Academy of Physical Education, whose award he received in 1950 for his research studies of physical abilities in adolescence. He was a member of the Central Commission on Mental Health and World Citizenship at the International Mental Hygiene Congress in 1948, and he served on the Program Committee of the International Congress on Gerontology in 1950-1951.

Harold Jones retired at the end of the academic year 1959-1960. During the last months of the spring semester he worked strenuously to put everything in order at the Institute. On June 3, he and Mary flew to Europe for a vacation, and this was intended to be the beginning of a rich period of retirement. He was scheduled to give papers at the International Congress of Psychology at Bonn and at the Seminar on the Growth of the Normal Child during the First Three Years at Zurich, sponsored by the International Children's Center. After three crowded days of sight-seeing and picture-taking in Paris, Harold Jones died of a heart attack on June 7.

It was somehow fitting that Harold should die abroad, while in the midst of life, and tragic that he should die at the beginning of a period of adventure to which he had for a long time been looking forward. He was a voyager from New England, reminiscent of those of the eighteenth and nineteenth centuries. With roots in the land, and with its traditions and

ethic firmly established in his character, he went out to explore the world. Sure of his basic identity and values, he was free to seek the exciting, the exotic, and the enchanting and to report back to those he knew would be especially interested. Just as he loved to go back to New England and to show his family the historic home of his ancestors, so he persisted in his upright, tough-minded, well-controlled, and down-to-earth way, while opening himself to what was new and strange and challenging. When one thinks of Harold, he thinks of stability and saneness, of dependability, of a man who left everything in order, both for his colleagues and successors and for his family, of a man who always had a plan—usually worked out with such imagination that it did not need to be changed. And one thinks of a certain strictness, the disposition to hold himself to a high standard and to expect a great deal of others. But one also thinks of his curiosity and eagerness, of his capacity to view with a naive eye a world that was always fascinating. And one thinks of his wit and humor, his capacity to make the unexpected remark, and, of course, of his irrepressible urge to produce humorous poems. As a product of New England, Harold seemed to approach the world with an extended time perspective. He had a sense of the continuity of culture. He was interested in things that had lasted a long time, and in all of his work he built for the future. He planted trees and originated longitudinal studies of human growth, both undoubtedly with the feeling that the future would reap the rewards. Everything that he did, whether it be writing a letter or taking a picture or developing a research institute, he did as if he were aware of how these things might look in the future, and he acted with the faith that the society of the future would be of a kind that could appreciate good work. He participated in a tradition and contributed to its perpetuation; but at the same time he had an enormous capacity to enjoy the moment, and, no matter how well-laid his long-range plans, they could always be modified to take account of present events. His life was a true development in the sense that there was a deep continuity with the past and at the same time a capacity to adapt to the present in a way that preserved the best of the past and left him capable of further development in the future. It was thus that we see in him the bearer of a great tradition, who, at the same time, was always abreast of, and often ahead of, his times.

The contrast that we have just noted involved but two sides of a highly complex person. The imagery of New England includes not only the granite of her mountains, but the gentleness of her hills and green valleys. There was toughness in Harold, but there was also gentleness and sensitivity and shyness. He was in some ways ill equipped for the rough and tumble of academic life. He never developed adequate techniques for dealing with hostility or irrationality. Each new outbreak of truculence or unreasonableness on the part of his academic colleagues seemed to leave him surprised and hurt. That he was able to build up a great Institute in an environment

that was in some fundamental ways inhospitable was due not only to his intelligence, creativity, and judgment of what was important, but also to his persistence, careful planning, and devotion to his purpose; to a special courage that enabled him to go ahead despite awareness of his vulnerability; to his capacity to make friends with people in all walks of life and to win the loyalty of students and associates.

The impressive achievements of the Institute of Child Welfare (the Institute of Human Development since 1958) were due in very large part to Jones' vision in foreseeing the areas of research in human development that would best repay investigation and in finding the people who had the ideas and the personal qualities necessary to continue these developmental studies for a generation. An early event of great significance was the beginning, at Jones' instigation, of a longitudinal study of the mental and motor development of infants in the first years of life. In 1928, he invited Nancy Bayley, who had developed a mental test for young children, to come to the Institute to direct a study which has continued for 30 years and yielded an account of mental and motor growth of normal children that is one of the most clear-cut to be found in the literature. A second, larger study, which Jones initiated in 1929, has been known as the Guidance Study. Knowing of the work of Jean Walker Macfarlane in treating children's problems at the University of California Medical School, he suggested that she evaluate the effects of "guidance" on a normal cross-section sample of the children from a survey of Berkeley children which he had made earlier. In the design of this study, a group matched on socioeconomic variables was also to be examined and studied but not given "guidance." Although the focus of interest changed into an intensive study of personality development in a representative sample of normal children, this study has continued and flourished; and Jones' foresight in initiating this investigation has yielded dividends far beyond original expectations. The third growth study, originally called the Adolescent Growth Study and more recently the Oakland Growth Study (since the subjects of this study are now in their late thirties), is the one with which Harold and Mary Jones were most intimately concerned. It is on the basis of findings from this study that Jones wrote two books and a monograph, in addition to many articles and papers. There is a bibliography of almost 200 publications based on this study alone. Recognition of Jones' creativity in anticipating the value of these growth studies has been accorded him not only in this country but abroad, where a number of developmental investigations have been patterned after the Institute studies.

Many aspects of developmental psychology have been enriched by Harold Jones' work. In the field of mental development, there was the Vermont Study, beginning in 1925, in which he and his associates, Herbert S. Conrad and others, gave individual mental tests to parents and children in a rural community. This project yielded a number of important publi-

cations, the first of which was called "A first study of parent-child resemblance in intelligence" (1928). This study is still the best of its kind in the field; it gives the most clear-cut answer that we have concerning the extent of parent-child resemblance in intelligence. Subsequent studies explored genetic and environmental correlates of mental growth, for example: "Environmental handicap in mental test performance" (1932); "A second study of familial resemblance in intelligence" (1940); "Environmental and genetic implications of parent-child and sibling correlations in the total sample" (1940); "Seasonal variations in IQ" (1941). Jones also made significant contributions in the field of physical-mental relationships and to the study of changes in mental organization in later life.

A second area which he found especially intriguing, and to which he contributed significantly, was emotional development. His work in this field led to such publications as "Emotional specificity" (1928); "Genetic studies of emotions" (1930); and perhaps most important, the series of studies of emotional development in which he used physiological measures as the criteria—"An experimental cabinet for physiological studies of emotions" (1936) and "The galvanic skin reflex as related to overt emotional expression" (1935). The GSR studies were carried on at all age levels—young infants, preschool children, adolescents, and adults. This was the research that excited Jones the most, that he put the most into, and that gave him the most pleasure. Here he was able to combine several of his major interests: an interest in the emotions, which we may understand as an expression of his broader and deeper interest in the biological bases of human behavior; a concern with the nature of adaptation and with the learning of controls in human development; and an interest in instruments and instrumentation. Jones was always fascinated by gadgets and contrivances. He was an indefatigable visitor to laboratories, where he poked around until he was quite sure that he knew how everything worked. And he could invent and fashion, with his hands, gadgets that were useful in the laboratory and contraptions that were useful on the farm. The research on the emotions also expressed Jones' basic preference for the experimental method as opposed to the other methods of psychological science. He liked the objective and the measurable. He was willing to use observational techniques in the study of children, as long as precautions were taken to ensure that these observations were objective; he was happy if other people at the Institute used interviews and projective techniques, but he was insistent that there be careful preparation, in advance, for the analysis of material collected in this way.

The third area of developmental psychology which owes a great deal to Jones is motor development. This area has not been popular among psychologists, despite the obvious importance of locomotor and manipulatory control in the early years of life and the importance of physical prowess to the self-conception of the adolescent. Jones brought out in brilliant fashion

the relationship of motor development to physiological maturation. The monograph "Motor Performance and Growth" (1949) was given an award.

We may gain understanding of Jones' career in research if we note that he was a general and experimental psychologist turned developmental psychologist. He was interested in all aspects of human functioning, and it seems that insofar as possible he wished to study them all in their developmental aspects. Perhaps the major integrating theme in his work was stated by him at the conclusion of his book *Development in Adolescence* (1943) when he spoke of his concern with "the complex ways in which nature and culture come into adaptation."

Although the growth studies constituted the major research focus of the Institute staff through the years, Harold Jones lent his interest and support to all kinds of things which were apparently remote from his immediate concerns, and very different from anything that he would think of doing himself. He fostered a series of studies based on psychoanalytic theory, and early in the history of the Institute he saw to it that problems of human development were seen in the perspectives of the social sciences as well as the biological. Jones himself remarked on the irony in the fact that, although he was brought up as a tough-minded psychologist (and his published work always met the most "hard-nosed" standards), he was often classed with the "soft-nosed" and often indeed found himself spiritually allied with them. We are reminded of the contrast in his character, pointed to earlier. He had the kind of scientific conscience that demanded the highest standards of rigor in research and writing, and yet he had the curiosity and breadth and spirit that left him open to all kinds of new ideas and always willing to give his support to anything that seemed to him the least bit promising. He was in many ways a conservative man, but he was an admirer and friend of rebels. It is difficult to say what major categories of psychologists Jones belonged to. Was he a specifist or a generalist? Was he an empiricist or was he more theoretically oriented? It is hard to say. His own work seemed often to be devoted to quite specific problems, and yet he included within the scope of the Institute's activities the widest variety of research activities and theoretical points of view. He sometimes expressed impatience with speculation, and particularly with the wild idea, but he was able and willing to nourish within the Institute the most theoretically oriented approaches to problems of personality development. One thinks again of the New Englander and the citizen of the world. If there was an underlying general scheme or frame of reference with which he approached the phenomena of human development, this scheme was no doubt rooted in biology. He was perfectly willing to admit that the biologically-given was susceptible to endless modification, but he wanted to be shown precisely how this modification was brought about. He was willing to entertain all kinds of hypotheses, but in the last analysis his major interest was in what actually happens and under just what conditions.

HAROLD ELLIS JONES, 1894–1960

In the course of his career Harold Jones had studied and improved almost every aspect of the field of developmental psychology. Men like him do not appear very often in science and, since this is an age of specialization, we may expect them to appear even less often in the future. We may hope that developmental psychology will continue to attract men who can do as much for it as he did, each in his own way.

Generations of undergraduate and graduate students at Berkeley will remember Jones as a teacher. One undergraduate said that Dr. Jones was the only professor he had who lectured in sentences. This is an indication not only of Harold Jones' mastery of the language but of the fact that he always had enough respect for his students, or for any other audience, that he came to the platform well prepared. His lectures were models of organization and clarity, and he was so well prepared that he could relax and be witty and entertaining and insert vivid examples as they came to him spontaneously. He was deeply interested in education, both in its theoretical and in its practical aspects. And he was interested in students. He had a rare ability to detect signs of future accomplishment. For 10 years his judgments about students were relied upon by the Fellowship Branch of the Social Science Research Council. And once he had discovered a talent he undertook with enthusiasm and devotion the task of nurturing it. As director of a research institute he always gave more than he received. He could do so many things so well that he must often have been tempted to do a job himself rather than to leave it to someone else, and yet his students and fellow-workers always had the impression that they had been helped but not interfered with. The only limit to the freedom he gave his staff was that set by the necessity of holding the Institute together. He could ask much of his associates in a joint enterprise because he demanded more of himself. And he never failed to give full credit to those who worked with him or published jointly with him. His help to others was modestly, even shyly, given. He often gave help unbeknownst to everyone except its recipient—and sometimes even to the recipient himself—so that when Harold died a great many people not only experienced a sense of loss, but were desolated by the feeling that it was impossible to repay what he had done for them.

Those who knew Harold well will miss him very much and for a long time. It is not only that we have lost a source of inspiration and guidance and of constant support for our best intentions; we shall miss him in a special way, because there was never a dull moment when Harold was around. He always had something interesting to propose for discussion. There was always the warm invitation to participate in one or another of his varied interests. There was the sudden unfolding of a plan, the suggested different way of looking at something familiar, the unexpected humorous remark, the gentle, subtle, often elaborately planned, practical joke, and there was always the ready attention to whatever one had on one's mind. Such was the richness of his personality that people liked him for different

reasons; and each of those who knew him, while sharing with others a general sense of loss, will miss him in some special, personally significant way.

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Bibliography

1. Experimental studies of college teaching. The effect of examination on permanence of learning. *Arch. Psychol.*, N.Y., 1923, No. 68.
2. The intelligence of preparatory school students. *J. educ. Psychol.*, 1926, 17, 376-383.
3. Phenomenal memorizing as a "special ability." *J. appl. Psychol.*, 1926, 10, 367-377.
4. A comparison of the intelligence of extension and college undergraduate students. *Sch. & Soc.*, 1927, 26, 1-4.
5. Attendance at moving pictures as related to intelligence and scholarship. *Calif. Parent-Teacher*, 1928, March, 17-20.
6. A first study of parent-child resemblance in intelligence. *Yearb. nat. Soc. Stud. Educ.*, 1928, 27(I), 61-72.
7. A pre-school research program. *J. educ. Method*, 1928, 12, 168-170.
8. Science enters the nursery. *Calif. Mon.*, 1928, September, 3-6.
9. (With Conrad, H. S., & Horn, A.) Psychological studies of motion pictures. II. Observation and recall as a function of age. *Univer. Calif. Publ. Psychol.*, 1928, 3, 225-243.
10. (With Hsiao, H. H.) A preliminary study of intelligence as a function of birth order. *J. genet. Psychol.*, 1928, 35, 428-433.
11. (With Jones, Mary C.) A study of fear. *Childh. Educ.*, 1928, 5, 136-143.
12. (With Wechsler, D.) A study of emotional specificity. *Amer. J. Psychol.*, 1928, 40, 600-606.
13. (With Wechsler, D.) Galvanometric technique in studies of association. *Amer. J. Psychol.*, 1928, 40, 607-612.
14. A comparison of objective examination methods. *J. educ. Method*, 1929, 8, 273-276.
15. Emotional factors in learning. *J. gen. Psychol.*, 1929, 2, 263-272.
16. Homogamy in intellectual abilities. *Amer. J. Sociol.*, 1929, 35, 1-14.
17. A program of research with motion pictures. *Nat. Board of Rev. Mag.*. 1929, March.
18. Studies of motor development. *Yearb. nat. Soc. Stud. Educ.*, 1929, 28(II), 465-493.
19. Studies of personality and social adjustment in early childhood. Nat. Res. Coun., Div. Anthrop. & Psychol., Third Congr. Res. Child Develpm., 1929 (Publ. 1930), Part I, 188-206.

20. (With Conrad, H. S.) Psychological studies of motion pictures. III. Fidelity of report as a measure of adult intelligence. *Univer. Calif. Publ. Psychol.*, 1929, 3, 245-276.

21. (With Conrad, H. S.) Psychological studies of motion pictures. IV. The technique of mental-test surveys among adults. *Univer. Calif. Publ. Psychol.*, 1929, 3, 277-284.

22. Child study at the University of California. *Sch. & Soc.*, 1930, 31, 674-677.

23. Child study in relation to parents. *Yearb. nat. Congr. Parents & Teachers*, 1930.

24. The galvanic skin reflex in infancy. *Child Develpm.*, 1930, 1, 106-110.

25. Heredity and environment in child development. *J. Hered.*, 1930, 21, 269-271.

26. The retention of conditioned emotional reactions in infancy. *J. genet. Psychol.*, 1930, 37, 485-498.

27. Twins. *Calif. Mon.*, 1930, May, 24-25.

28. (With Conrad, H. S.) Rural preferences in motion pictures. *J. soc. Psychol.*, 1930, 1, 419-423.

29. (With Jones, Mary C.) Genetic studies of emotions. *Psychol. Bull.*, 1930, 27, 40-64.

30. (With Jones, Mary C.) Growth of mind. *Calif. Mon.*, 1930, April, 22-25.

31. *Children's fears.* Chicago: Univer. Chicago Press, 1931.

32. The conditioning of overt emotional responses. *J. educ. Psychol.*, 1931, 22, 127-130.

33. Dextrality as a function of age. *J. exp. Psychol.*, 1931, 14, 125-143.

34. Fears—normal and abnormal. *Calif. Parent-Teacher*, 1931, December, 11 & 24.

35. Growth of emotions. *Calif. Mon.*, 1931, May, 15-17.

36. Mental tests of young children. *New Era* (London), 1931, 12, 164-166.

37. The pattern of abilities among adult and juvenile defectives. *Univer. Calif. Publ. Psychol.*, 1931, 5, 47-61.

38. (With Conrad, H. S.) Psychological studies of motion pictures. V. Adolescent and adult sex differences in immediate and delayed recall. *J. soc. Psychol.*, 1931, 2, 433-459.

39. (With Wilson, P. T.) A study of like-sexed twins. I. The vital statistics and familial data of the sample. *Hum. Biol.*, 1931, 3, 107-132.

40. The child becomes a social being. *Calif. Parent-Teacher*, 1932, May, 10-11, 23.

41. Learning in young children—an experimental study. *Calif. Parent-Teacher*, 1932, February, 8-9.

42. (With Conrad, H. S.) A field study of the differential birth rate. *J. Amer. statist. Ass.*, 1932, 27, 153-159.

43. (With Conrad, H. S., & Blanchard, M. B.) Environmental handicap in mental test performance. *Univer. Calif. Publ. Psychol.*, 1932, 5, 63-99.

44. (With Dunn, Dorothy) The configural factor in children's learning. *J. genet. Psychol.*, 1932, 41, 3-15.

45. (With Jones, Mary C.) Discovering all about things. *Child Study*, 1932, 10, 67-68.

46. (With Wilson, P. T.) Left-handedness in twins. *Genetics*, 1932, 17, 560-571.

47. (With Wilson, P. T.) Reputation differences in like-sex twins. *J. exp. Educ.*, 1932, 1, 86-91.

48. In the order of their arrival. *Calif. Parent-Teacher*, 1933, January, 8-9, 30.

49. Mental adjustments of crippled children. *Rep. Proc. north. Calif. Coun. Educ. except. Child*, 1933, 29-36.

50. Order of birth. In C. Murchison (Ed.), *A handbook of child psychology.* Worcester, Mass.: Clark Univer. Press, 1933. Pp. 551-589.

51. The personality study of adolescents. Nat. Res. Coun., Div. Anthrop. & Psychol., Fourth Congr. Res. Child Develpm., 1933, Appendix I, 1-11.

52. Relationships in physical and mental development. *Rev. educ. Res.,* 1933, 3, 150-162, 177-181.

53. (With Brooks, F. D., Cattell, Psyche, & Stoddard, G. D., Eds.) Mental and physical development. *Rev. educ. Res.,* 1933, 3, No. 2.

54. (With Conrad, H. S.) The growth and decline of intelligence: A study of a homogeneous group between the ages of ten and sixty. *Genet. Psychol. Monogr.,* 1933, 13, 225-298. Reprinted in R. G. Kuhlen and G. G. Thompson (Eds.), *Psychological studies of human development.* New York: Appleton-Century-Crofts, 1952. Pp. 164-172.

55. (With Conrad, H. S., & Hsiao, H. H.) Sex differences in mental growth and decline. *J. educ. Psychol.,* 1933, 24, 161-169.

56. (With Hsaio, H. H.) Pregnancy order and early development. *Child Develpm.,* 1933, 4, 140-147.

57. (With Tryon, Caroline M.) Relationship between "speed" and "altitude." *J. exp. Psychol.,* 1933, 16, 98-114.

58. Children at the movies. *J. Amer. Ass. Univer. Women,* 1934, 27, 221-225.

59. (With Carter, H. D., & Shock, N. W.) An experimental study of affective factors in learning. *J. educ. Psychol.,* 1934, 25, 203-215.

60. Convergent trends in psychology and related sciences. *Proc. Twenty-fifth Anniversary Celebration of Inauguration of Graduate Studies at U.S.C.,* November, 1935, 137-141.

61. The galvanic skin reflex as related to overt emotional expression. *Amer. J. Psychol.,* 1935, 47, 241-251.

62. The growth study as a psychological method. Soc. Res. Child Develpm., 1935. (Bulletin)

63. (With Burks, Barbara S.) A study of differential fertility in two California cities. *Hum. Biol.,* 1935, 7, 539-554.

64. An experimental cabinet for physiological studies of emotion. *Child Develpm.,* 1936, 7, 183-188.

65. Relationships in physical and mental development. *Rev. educ. Res.,* 1936, 6, 102-123, 146-152.

66. The relationship of physical factors to personality. In Mary C. Jones & Barbara S. Burks, Development in childhood. *Monogr. Soc. Res. Child Develpm.,* 1936, I, No. 4. Pp. 134-136.

67. (With Brooks, F. D., Cattell, Psyche, Meek, Lois H., & Stoddard, G. D., Eds.) Mental and physical development. *Rev. educ. Res.,* 1936, 6, No. 1.

68. The contribution of biology to education and social progress. *Proc. nat. Conf. progr. Educ. Ass.,* 1937, No. 5, 11-23.

69. Reaction-time and motor development. *Amer. J. Psychol.,* 1937, 50, 181-194. (Golden Jubilee Volume)

70. (With Bayley, Nancy) Environmental correlates of mental and motor development: a cumulative study from infancy to six years. *Child Develpm.,* 1937, 8, 329-341. Reprinted in Wayne Dennis (Ed.), *Readings in child psychology.* New York: Prentice-Hall, 1951. Pp. 153-166.

71. (With Carter, H. D.) A further study of affective factors in learning. *J. genet. Psychol.*, 1937, 50, 157-163.
72. (With Honzik, Marjorie P.) Mental-physical relationships during the preschool period. *J. exp. Educ.*, 1937, 6, 139-146.
73. The citizen goes to school. *Nat. Parent-Teacher*, 1938, 33, 8-10, 39.
74. The California adolescent growth study. *J. educ. Res.*, 1938, 31, 561-567.
75. (With Yoshioka, J. G.) Differential errors in children's learning on a stylus maze. *J. comp. Psychol.*, 1938, 25, 463-480.
76. The adolescent growth study. I. Principles and methods. II. Procedures. *J. consult. Psychol.*, 1939, 3, 157-159, 177-180.
77. Relationships in physical and mental development. *Rev. educ. Res.*, 1939, 9, 1-12.
78. (With Brooks, F. D., Cattell, Psyche, & Stoddard, G. D., Eds.) Mental and physical development. *Rev. educ. Res.*, 1939, 9, No. 1.
79. (With Conrad, H. S., & Murphy, Lois B.) Emotional and social development and the educative process. *Yearb. nat. Soc. Stud. Educ.*, 1939, 38, 361-389.
80. (With Washburne, C., Anderson, J. E., Brooks, F. D., Brueckner, L. J., Jensen, K., Jersild, A. T., & Tyler, R. W., Eds.) Child development and the curriculum. *Yearb. nat. Soc. Stud. Educ.*, 1939, 38(I).
81. Educational research at the Institute of Child Welfare. *J. educ. Res.*, 1940, 34, 158-159.
82. The adolescent growth study. V. Observational methods in the study of individual development. *J. consult. Psychol.*, 1940, 4, 234-238.
83. (With Conrad, H. S.) A second study of familial resemblance in intelligence: environmental and genetic implications of parent-child and sibling correlations in the total sample. *Yearb. nat. Soc. Stud. Educ.*, 1940, 39(II), 97-141.
84. (With Jorgensen, A. P.) Mental growth as related to nursery-school attendance. *Yearb. nat. Soc. Stud. Educ.*, 1940, 39(II), 207-222.
85. (With Stoddard, G. D., Carmichael, L., Freeman, F. N., Goodenough, Florence L., Terman, L. M., Wellman, Beth L., & Hollingsworth, Leta S., Eds.) Intelligence: its nature and nurture. *Yearb. nat. Soc. Stud. Educ.*, 1940, 39(I, II).
86. (With Shock, N. W.) The relationship between basal physiological functions and intelligence in adolescents. *J. educ. Psychol.*, 1940, 31, 369-375.
87. The adopted child. *Nat. Parent-Teacher*, 1941, April, 30-33.
88. Child Development XVII. Physical-mental relationships. In W. S. Monroe (Ed.), *Encyclopedia of educational research*. New York: Macmillan, 1941. Pp. 182-185.
89. Seasonal variations in IQ. *J. exp. Educ.*, 1941, 10, 91-98.
90. (With Bayley, Nancy) The Berkeley growth study. *Child Develpm.*, 1941, 12, 167-173.
91. (With Jersild, A. T., Garrison, K. C., Jensen, K., & Ojemann, R. H., Eds.) Growth and development. *Rev. educ. Res.*, 1941, 11, No. 5.
92. (With Jones, Mary C.) Attitudes of youth toward war and peace. *Calif. J. secondary Educ.*, 1941, 16, 427-430.
93. (With Read, Katherine) The adopted child. *Nat. Parent-Teacher*, 1941, 35, 30-33.
94. (With Read, Katherine) Sex education for the preschool child. *Hygeia*, 1941, 19, 360-362, 431.
95. (With Shock, N. W.) Mental development and performance as related to physical and psychological factors. *Rev. educ. Res.*, 1941, 11, 531-552.

96. The problems of child development. *J. consult. Psychol.*, 1942, 6, 123-127.
97. (With Morgan, D. H.) Twin similarities in eye movement patterns. *J. Hered.*, 1942, 33, 167-172.
98. (With Moses, P. J.) The adolescent growth study. VI. The analysis of voice records. *J. consult. Psychol.*, 1942, 6, 255-261.
99. *Development in adolescence.* New York: Appleton-Century, 1943. Reprinted in R. G. Barker, J. S. Kounin, & H. F. Wright (Eds.), *Child behavior and develment.* New York: McGraw-Hill, 1943. Pp. 545-566.
100. Adolescence. N. Y. Conf. Amer. Ass. Sch. Administrators. *The Nation's Schools*, 1944, 33, 29-30.
101. The development of physical abilities. *Yearb. nat. Soc. Stud. Educ.*, 1944, 43(I), 100-122.
102. (With Batalla, M.) Transfer in children's maze learning. *J. educ. Psychol.*, 1944, 35, 474-483.
103. (With Bell, R., Freeman, F. N., Greulich, W. W., Mackenzie, G. N., May, M. A., & Prescott, D. A., Eds.) Adolescence. *Yearb. nat. Soc. Study Educ.*, 1944, 43(I).
104. (With Conrad, H. S.) Mental development in adolescence. *Yearb. nat. Soc. Stud. Educ.*, 1944, 43(I), 146-163.
105. (With Conrad, H. S., & Freeman, F. N.) Differential mental growth. *Yearb. nat. Soc. Stud. Educ.*, 1944, 43(I), 164-184.
106. (With Seashore, R. H.) The development of fine motor and mechanical abilities. *Yearb. nat. Soc. Stud. Educ.*, 1944, 43(I), 123-145.
107. Trial and error learning with differential cues. *J. exp. Psychol.*, 1945, 35, 31-45.
108. (With Kaplan, O. J.) Psychological aspects of mental disorders in later life. In O. J. Kaplan (Ed.), *Mental disorders in later life.* Stanford: Stanford Univer. Press, 1945. Pp. 69-115.
109. (With Yoshioka, J. G.) An analysis of chidren's maze learning. *J. genet. Psychol.*, 1945, 67, 203-214.
110. Introduction: Frames of observation of social behavior. In Frances Newman, The adolescent in social groups. *Appl. Psychol. Monogr.*, 1946, 9, 9-15.
111. The educational psychology of persons. *J. educ. Psychol.*, 1946, 37, 513-526.
112. Environmental influences on mental development. In L. Carmichael (Ed.), *Manual of child psychology.* New York: Wiley, 1946. Pp. 582-632.
113. Skeletal maturing as related to strength. *Child Develpm.*, 1946, 17, 173-185.
114. Physical ability as a factor in social adjustment in adolescence. *J. educ. Res.*, 1946, 40, 287-301.
115. (With Jones, Mary C.) Problems in child development. *Nat. Parent-Teacher*, 1946, 41, 17-19.
116. Sex differences in physical abilities. *Hum. Biol.*, 1947, 19, 12-25.
117. Sexual maturing of girls as related to growth in strength. *Res. Quart.*, 1947, 18:2, 135-143.
118. The relationship of strength to physique. *Amer. J. phys. Anthrop.*, N. S., 1947, 3, 29-39.
119. The radio and movies in redirecting the delinquent. National Probation & Parole Ass., 1948, 66-77.
120. (With Murphy, Lois B.) Review of Rose H. Alschuler & La Berta W. Hattwick, *Painting and personality.* *J. educ. Psychol.*, 1948, 39, 243-247.

121. Adolescence in our society. In *The family in a democratic society.* Anniversary papers Community Serv. Soc. N.Y. New York: Columbia Univer. Press, 1949. Pp. 70-84. Reprinted in R. F. Winch & R. McGinnis (Eds.), *Selected studies in marriage and the family.* New York: Henry Holt, 1953. Pp. 243-254. And reprinted in J. M. Seidman (Ed.), *The adolescent: A book of readings.* New York: Dryden Press, 1953. Pp. 50-60.

122. Motor performance and growth. A developmental study of static dynamometric strength. *Univer. Calif. Publ. Child Develpm.,* 1949, 1, No. 1.

123. Child Development XVI. Physical-mental relationships. In W. S. Monroe (Ed.), *Encyclopedia of educational research.* (Rev. Ed.) New York: Macmillan, 1950. Pp. 195-197.

124. Research on aging. Proc. Conf. Pacific Coast Committee on Old Age Research. New York: Social Science Research Council, 1950. H. E. Jones, Editor and Chairman of the Conference.

125. The study of patterns of emotional expression. In M. L. Reymert (Ed.), *Feelings and emotions.* New York: McGraw-Hill, 1950. Pp. 161-168.

126. (With Bayley, Nancy) Growth, development, and decline. *Annu. Rev. Psychol.,* 1950, 1, 1-8.

127. (With Shirley, Mary) Child Development XVI. Locomotor and manipulatory control. In W. S. Monroe (Ed.), *Encyclopedia of educational research.* (Rev. Ed.) New York: Macmillan, 1950. Pp. 163-165.

128. Proc. Governor's Conf. on the Problems of the Aging, October, 1951, Sacramento. Report of Chairman of Research Division, H. E. Jones (Editor).

129. (With Eichorn, Dorothy H.) Development of mental functions. *Rev. educ. Res.,* 1952, 22, 421-438.

130. Recommended objectives in personal development and social maturation. Suppl., *Elementary school objectives.* Princeton: Educational Testing Service, 1953. Pp. 103-110.

131. The environment and mental development. In L. Carmichael (Ed.), *Manual of child psychology,* (2nd Ed.). New York: Wiley, 1954. Pp. 631-696.

132. Age changes in adult mental abilities. In *Old age in the modern world.* London: E. S. Livingstone, 1955. Pp. 267-274.

133. Perceived differences among twins. *Eugen. Quart.,* 1955, 2, 98-102.

134. (With Pinneau, S. R.) Mental development in infancy and childhood and mental abilities in adult life. *Rev. educ. Res.,* 1955, 25, 415-437.

135. Perceptive and intellective abilities. In J. E. Anderson (Ed.), *Psychological aspects of aging.* Proc. Conference on Planning Research, Bethesda, Md., April, 1955. Washington, D.C.: Amer. Psychol. Ass., 1956. Pp. 135-173.

136. The replacement problem in child development. *Child Develpm.,* 1956, 27, 237-240.

137. (With Kaplan, O. J.) Psychological aspects of mental disorders in later life. In O. J. Kaplan (Ed.), *Mental disorders in later life.* (Rev. Ed.) Stanford: Stanford Univer. Press, 1956. Pp. 98-156.

138. Motor development and coordination in the adolescent. In *Physical and behavioral growth.* Rep. Twenty-sixth Ross pediat. Res. Conf. Columbus, Ohio: Ross Laboratories, 1957. Pp. 78-83.

139. Physical changes of adolescence. *Nat. Parent-Teacher,* 1957, 52, 8-10.

140. (With Jones, Mary C.) *Growth and behavior in adolescence.* Berkeley: Univer. Calif. Extension, 1957.

141. Consistency and change in early maturity. *Vita Humana,* 1958, 1, 43-51.

142. Problems of method in longitudinal research. *Vita Humana,* 1958, 1, 93-99.

143. (With Eichorn, Dorothy H) Maturation and behavior. In Georgene S. Seward & J. P. Seward (Eds.), *Current psychological issues.* New York: Henry Holt, 1958. Pp. 211-248.

144. (With Jones, Mary C.) *Adolescence.* Chicago: Compton, 1958.

145. (With Lee, J. M., Anderson, H., Birren, J. E., Combs, A. W., Craig, R. C., Jensen, K., & Thorpe, L. P., Eds.) Growth, development and learning. *Rev. educ. Res.,* 1958, 28, No. 5.

146. (With Pinneau, S. R.) Development of mental abilities. *Rev. educ. Res.,* 1958, 28, 392-400.

147. Intelligence and problem-solving. In J. E. Birren (Ed.), *Aging and the individual.* Chicago: Univer. of Chicago Press, 1959. Pp. 700-738.

148. (With Macfarlane, Jean W., & Eichorn, Dorothy H.) A progress report on growth studies at the University of California. *Vita Humana,* 1959, 3, 17-31.

149. The longitudinal method in the study of personality. In I. Iscoe & H. Stevenson (Eds.), *Personality development in children.* Austin: Univer. of Texas Press. In press.

ASSOCIATIVE TRANSFER AS SHOWN BY RESPONSE SPEEDS IN MOTOR PAIRED-ASSOCIATE LEARNING

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An interesting feature of the classical A-B . . . A-C associative interference paradigm in human learning is the apparent scarcity of what one might expect to be the most obvious source of interference. The *Ss* make the mistake of responding "B" rather rarely in the second task, and the "intrusions" error category forms only a small percentage of recorded errors. Apparently, human *Ss* are easily able to inhibit expression of their first-learned response once they recognize its inappropriateness. Nevertheless, when nonspecific positive transfer is controlled in this paradigm, first learning clearly interferes with second learning.

A recent series of studies, in demonstrating the negative transfer effect, showed also that the interference was quite closely related to the "omissions" error category—that is, to failures to respond within the time limit set by the procedure (3). The possibility then arises that an increase in time permitted for choice might, by reducing omissions, materially reduce associative interference as conventionally expressed in percentage of errors. At the same time, measures of the speed of correct responses should reveal an implicit interference by showing that the more the first learning the slower the *S* will be in finding his correct response in task II.

In their second experiment, Spiker and Holton compared groups given 5, 10, and 20 trials for first-task training and found that the more the training the more the interference—with *Ss* concurrently learning items in an A-B . . . D-C paradigm to provide control information about nonspecific

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positive transfer effects such as warmup and learning-to-learn. The anticipation interval was 2 sec. in their second task. Using the same motor paired-associates apparatus and procedure, the present study repeats their groups 5 and 20 with a more lenient, 4-sec. anticipation interval, and recording of time of response, in task II.

Method

Apparatus

The apparatus, described earlier in detail, was designed to present motor paired-associate learning tasks in which *S* learns to associate a different pushbutton with each of six stimulus lights differing in hue. It permits the presentation of a stimulus for a set anticipation interval, followed by a timed interval during which the stimulus is presented jointly with an informational light beside the correct button, followed in turn by a timed interpresentation interval. The *S* is instructed to respond by pushing the correct button prior to the onset of the informational light. A bell sounds immediately if his response is correct and, whether or not it is correct, the informational light is automatically turned on at the end of the anticipation interval.

Subjects, Design, and Procedure

The *S*s were fifth grade children from the Ottumwa (Iowa) Public Schools.[1] The data for five children were incomplete—for two because of procedural errors, and for three because of mechanical failures. There remained a total of 48 *S*s, 24 in each of two experimental groups.

All *S*s were given three stimuli in task I and were required to learn to associate a particular button (of nine) with each stimulus. One group (*group 5*) had five trials of training; the other (*group 20*) had 20. In their second task, all *S*s were given the three stimuli of task I and three stimuli they had not previously used and were required to learn to associate new buttons with each of the six stimuli. Thus, in task II, half the light-button pairs represented an A-B . . . A-C paradigm and the other half an A-B . . . D-C paradigm. All *S*s had 12 trials on task II. A trial in task I consisted of the presentation of all three of an *S*'s stimuli and in task II of all six of his stimuli. In both tasks, six different presentation orders were used.

In task I, the anticipation interval was 2 sec., the joint-presentation interval was 2 sec., and the between-presentation interval was 3 sec. In task II, the anticipation interval was 4 sec., and the other two intervals were each 2 sec. The time taken to respond during task II was measured on

[1] The authors are indebted to Mr. R. O. Wright, Director of Curriculum, Ottumwa Public School System, Ottumwa, Iowa, for his generous permission to use the *S*s of this experiment. Thanks are also due Mr. Albert Whittlessey, Principal, Wilson Elementary School, and his teaching staff, for their fine cooperation in providing facilities and for their assistance in many other ways.

a Standard Electric timer and the button chosen was recorded. Other details of counterbalancing, instructions, and procedures were the same as those reported earlier.

Results

Task I

Groups 5 and 20 gave means of 6.2 and 6.1 correct responses, respectively, over the first five trials of task I, indicating that they were comparable in ability at a task of this sort. Group 20's mean of 14.0 over its last five trials represents a significant increase over the five trials of group 5 and indicates that the two groups differed in degree of learning of task I at the end of their training.

Table 1

MEAN NUMBER OF CORRECT RESPONSES AND OF CORRECT RESPONSES WITH LATENCIES LESS THAN TWO SECONDS

Group	*Correct Responses*		*Correct in Two Seconds*	
	D-C	A-C	D-C	A-C
Group 5	25.2	24.0	19.9	19.7
Group 20	25.2	23.5	20.2	16.1

Task II

Total correct responses. Mean numbers of correct responses to the D-C and A-C pairs of task II are presented on the left side of Table 1. The two groups gave substantially the same number of correct responses and, while more correct responses were given to D-C than to A-C pairs, the difference between these conditions was about the same for both groups. Analysis of variance (1) of these data (Table 2, left) revealed no significant effect involving Groups. The significant Conditions effect indicates the reliability of the finding that there were more correct responses, over-all, to D-C than to A-C pairs.

The significant Subgroups $\times$ Conditions effect indicates that the A-C, D-C difference is to some degree dependent on the stimuli and responses which were counterbalanced among the subgroups. Since the effect does not interact with the Groups factor, its significance does not alter the principal conclusion to be drawn from this analysis—that, using a 4-sec. anticipation interval, amount of first-task learning does not affect associative interference as reflected by frequency of correct responses.

Types of error. Counts of the different types of task II errors further confirm the above conclusion. An "omission" is defined as a failure to

TABLE 2

ANALYSES OF VARIANCE OF NUMBER AND OF MEAN SPEED OF CORRECT RESPONSES IN TASK II

Source	df	Number Correct		Mean Speed	
		MS	F	MS	F
Between Subjects	47				
Groups (G)	1	1.26	< 1.00	3589	2.33
Subgroups (S)	5	40.06	< 1.00	1717	1.11
G × S	5	40.06	< 1.00	1079	< 1.00
Error (b)	36	40.88		1541	
Within Subjects	48				
Conditions (C)	1	49.59	5.86*	1155	3.75
G × C	1	2.35	< 1.00	3027	9.83***
S × C	5	33.10	3.91**	122	< 1.00
G × S × C	5	13.69	1.62	411	1.33
Error (w)	36	8.46		308	
Total	95				

* $p < .025$
** $p < .01$
*** $p < .005$

respond during the anticipation interval, an "intralist error" as the selection of a button that is correct for a stimulus other than the one presented, and a "task I intrusion" as the selection of a button used in task I. Each of these errors could be made to both A-C and D-C pairs: associative interference is indicated when relatively more are made to the A-C pairs. A subcategory of task I intrusions is logically tied to associative interference: "old habit errors" consist in giving as response to an A-C stimulus in task II the button that was correct for it in task I.

TABLE 3

FREQUENCY OF DIFFERENT TYPES OF ERROR ON TASK II

Type of Error	Group 5		Group 20		Combined Groups	
	A-C	D-C	A-C	D-C	A-C	D-C
Omissions	9	12	27	18	36	30
Intralist errors	175	169	163	160	338	329
Task I intrusions	104	79	109	82	213	161
(*Old habit errors*)	(44)		(58)		(102)	
Total	288	260	299	260	587	520

No type of error shows a strong difference in associative interference between groups 5 and 20 (Table 3). That associative interference was present is shown by the combined groups' errors, with each type of error being greater for A-C than for D-C pairs. Only in the case of task I intrusions, however, was the difference significant ($p < .025$).

Speed of correct responses. The time taken to give each correct response during task II was converted into a speed measure by a reciprocal transformation. Figure 1 shows an average of *Ss*' mean speeds to their A-C and D-C pairs taken over blocks of three trials. It is seen that group 20 shows more interference than does group 5: while *Ss* in group 5 showed no tendency to respond more rapidly to their D-C than to their A-C pairs—indeed, in the first block, a slightly greater speed to the A-C pairs ($t < 1$)—*Ss* in group 20 consistently responded more rapidly to their D-C pairs. Analysis of variance (Table 2, right) shows the Groups × Conditions effect to be statistically reliable. Subanalyses, using t tests, showed that the mean speeds of group 5 *Ss* to their D-C and A-C pairs (60.6 and 61.7) were not significantly different, while those of group 20 (60.4 and 55.8) differed significantly ($p < .001$).

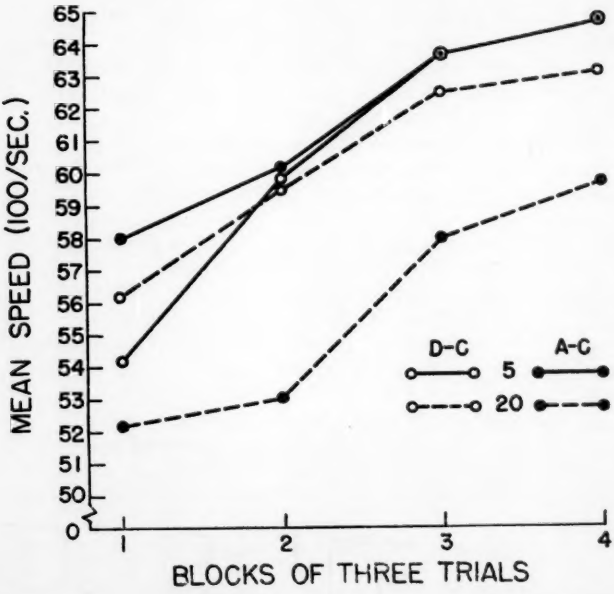

FIGURE 1—Mean speed of correct responses for the A-C and D-C pairs of task II over blocks of three trials, groups 5 and 20 taken separately.

Correct responses with two-second latencies. Thus far, the analyzed results have shown that the effects of first-task practice upon associative interference are negligible given the 4-sec. anticipation interval, but that first-task practice does slow response to the A-C pairs. The latter finding enables us to reintroduce artificially associative interference by rescoring the data to call correct only those responses made to the correct button within 2 sec. of stimulus onset—in effect, setting aside all longer-latency correct responses as "omissions." The mean numbers of correct responses which occurred within 2 sec. are shown in the right side of Table 1 for each of the four combinations of groups by conditions. While group 5 shows a comparable number of correct responses to its D-C and A-C pairs, group 20 averages fewer correct to A-C than to D-C. Corroborating this, an analysis of variance of the 2-sec. data shows a significant Groups $\times$ Conditions effect ($p < .025$). This artificially reintroduced associative interference resembles that found by Spiker and Holton (3, Experiment II), whose groups were actually required to respond within 2 sec.

Discussion

It appears that much of the interference in the A-B . . . A-C paradigm can be accounted for by the prolonging of time of choice; whether or not this paradigm will result in errors appears to depend upon whether *S*s are interrupted in their search for a response by a time limit, or else are given enough time to come up with a response.

However, it will be noted that the lengthened anticipation interval of this study did not completely do away with associative interference since there still were fewer correct responses to the A-C than to the D-C pairs of task II.

The 4-sec. interval, while lenient, did not always give enough time for responding. Failures to respond averaged 1.4 per *S* in the second task—*S*s in group 5 averaging 0.9 omissions, those in group 20 averaging 1.9. These figures are considerably below the mean of 10.4 omissions per *S* obtained by Spiker and Holton for their two comparable groups, but might account for part of such A-C, D-C differences as appeared by showing that 4 sec. was not quite long enough for all *S*s to complete all their deliberations.

A second consideration has to do with the speed with which *S*s paced themselves. In each group, *S*s were rank-ordered in terms of their speed while giving a correct response. Separate subgroups were established consisting of the upper, middle, and lower thirds of this rank-ordering, and the subgroups were compared for associative interference. Subgroups of slower *S*s in both groups showed no error differences, but subgroups of medium speed and faster *S*s showed more errors to A-C than to D-C pairs (Table 4).

These may be chance differences, since two simple analyses of variance, comparing separately the two sets of subgroups, failed to show significance

TABLE 4

MEAN A-C, D-C ERROR DIFFERENCES FOR SUBGROUPS OF THE EIGHT FASTER, MEDIUM SPEED, AND SLOWER RESPONDERS IN GROUPS 5 AND 20

	SUBGROUP		
Measure	*Faster*	*Medium Speed*	*Slower*
Group 5			
"Mean time" in sec.*	1.4	1.6	1.9
Errors (A-C) — (D-C)	1.8	1.6	0.0
Group 20			
"Mean time" in sec.*	1.6	1.7	1.9
Errors (A-C) — (D-C)	2.2	3.0	0.0

* Quotes because not an over-all mean, but an average of averages.

for the interference differences among either set. At best, these data suggest an interesting hypothesis about a second source of associative interference, one which is not inconsistent with what has gone before. Possibly, the tendency towards associative interference may in some cases be a function of a time-control which *S*, rather than *E*, imposes. The *S*s who respond rapidly may tend to make errors which slower-responding *S*s inhibit.

Returning to the general trend, there finally remains the question of what occupies those *S*s who deliberate an extra amount of time before responding correctly to their A-C pairs. Little evidence is available on this beyond a report by Siipola (2) who obtained evidence suggesting that, at least in part, *S*s are engaged in conflict about the tendency towards intrusion of the older, A-B learning.

SUMMARY

Two groups of 24 fifth grade children were given preliminary training on a paired-associate motor task consisting of three S-R pairs. Group 5 received five training trials, while group 20 received 20. The transfer task for each *S* consisted of six new pairs, three of them constituting an A-B . . . A-C interference paradigm, the other three an A-B . . . D-C control. A lenient 4-sec. anticipation interval was allowed on task II. Comparison of A-C and D-C pairs for groups 5 and 20 showed no significant differences in interference as reflected by frequency of correct responses. When speed of responding was considered, group 20 showed significantly more interference than group 5.

REFERENCES

1. LINDQUIST, E. F. *Design and analysis of experiments in psychology and education.* Boston: Houghton Mifflin, 1953.

2. Siipola, E. M. Implicit or partial reversion errors: a technique of measurement and its relation to other measures of transfer. *J. exp. Psychol.*, 1940, 26, 53-73.

3. Spiker, C. C., & Holton, R. B. Associative interference in motor paired-associate learning. *J. exp. Psychol.*, 1958, 56, 114-132.

ACCULTURATIVE STRESS IN MODERN MAORI ADOLESCENCE[1]

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To anyone concerned with cross-cultural and dynamic aspects of adolescent personality development, modern Maori culture offers almost unlimited research opportunities. With the onset of adolescence in Western culture, children are expected to strive more for *primary status* based on their own efforts, competence, and performance ability and to strive less for *derived status* predicated on their personal qualities and on their dependent relationship to and intrinsic acceptance by parents, relatives, and peers. Concomitantly, in support of this shift in the relative importance and availability of primary and derived status, adolescents are expected to be less dependent than children on the approval of their elders, to play a more active role in formulating their own goals, and to relate more intimately to peers than to parents. They are also under greater pressure to persevere in goal striving despite serious setbacks, to postpone immediate hedonistic gratification in favor of achieving long range objectives, and to exercise more initiative, foresight, executive independence, responsibility, and self-discipline (2).

But what happens to adolescent development in cultures such as the Maori where the importance of derived status is not de-emphasized to the same extent during and after adolescence as is customary in Western civi-

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lization, where youth and adults alike continue to obtain a substantial portion of their self-esteem from a broad-based system of mutual psychological support, emotional interdependence, and reciprocal obligations (4, 7)? What course does adolescent personality development take when the culture is less concerned than ours with personal ambition, self-enhancing achievement, and other self-aggrandizing features of primary status and places greater stress on task-oriented motivation, on kinship obligations, on the enhancement of group welfare and prestige, and on the social values of working cooperatively toward common objectives (4)? Do traits important for implementing achievement goals (e.g., persistence, self-denial) develop when the attainment of vocational success is considered a less important reason for living and criterion of status in the community (4)? Are personality outcomes markedly different when peers rather than parents are the principal socializing agents and sources of derived status prior to adolescence (7), when, instead of abrupt emancipation from the home and general alienation from the adult community during adolescence, rapprochement with parents and the adult world occurs (6, 7) and adolescents assume the role of junior adults instead of living in a separate world of peripheral status (school and peer group) as in our society (7)?

Adding further interest to the problem of modern Maori adolescence is the fact that the above description by the Beagleholes is more typical of an earlier period in the post-withdrawal phase[2] of Maori acculturation, whereas Ritchie's and Mulligan's accounts are more typical of the current adolescent scene in an isolated and relatively backward rural Maori community. The present-day Maori, both in more progressive rural areas and in urban centers, are generally much further along on the acculturation continuum; and the perpetuative device of semicomplete physical, social, and psychological withdrawal, whereby an attenuated version of traditional Maori culture was preserved in the face of external pressures to change, although still a factor to be reckoned with today, is a less vigorous social reality than even a decade ago. In the struggle for the value orientations and emotional identification of the coming generation of Maori adults, adolescence constitutes the major psychological battleground on which the conflicting claims of two contrasting cultures are being fought. The Maori

[2] The Maori, a Polynesian people, migrated to New Zealand about 1350 A.D., probably from the Society Islands. Initial contact with Europeans, beginning in 1769, was largely characterized by the incorporation of selected aspects of European goods and technical processes into traditional Maori social and economic organization without any fundamental changes in the value system. Threatened, however, by massive European colonization and coercive alienation of their land, contrary to treaty guarantees, the Maori were forced into war with the British colonists. Catastrophically defeated but not annihilated after a dozen years of bitter conflict (1860-1872), they withdrew, resentful and disillusioned, into reservation-like areas and villages. Emergence from this withdrawal and entrance into the mainstream of New Zealand life first began in earnest with the onset of World War II and is still continuing, despite growing indications of color prejudice and discrimination.

adolescent is still caught midstream between two worlds, but in most districts of New Zealand he is considerably closer to the *pakeha* (European) shore than previous investigators have pictured him.

Problem and Research Design

The present study was concerned with the psychological mechanisms through which this cultural tug of war is carried on and influences the outcome of Maori adolescence. It approached this problem by seeking to identify culturally determined uniformities and differences in the personality structure and development of Maori and pakeha adolescents and how they are transmitted to the developing individual. More specifically, it sought (a) to identify Maori-pakeha uniformities and differences in expressed and internalized levels of academic and vocational aspiration and in the kinds of motivations underlying these aspirations; (b) to identify Maori-pakeha uniformities and differences in supportive personality traits important for the realization of achievement goals; and (c) to relate these motivational and other personality differences to cultural and interpersonal factors and mechanisms that account for their transmission from one generation to the next.

Another focus of research concern was on urban-rural differences in aspirational pattern among Maori adolescents and on the relative magnitude of Maori-pakeha differences in urban and rural areas. An attempt was also made to assess the relative magnitude and significance of Maori-pakeha differences by comparing them to urban-rural differences.

The general plan was to utilize a rural and an urban group of Maori male adolescents and comparable groups of pakeha adolescents from the same localities. Partly because of the advantage of ready accessibility to subjects and partly because one focus of inquiry was on academic aspirations, only young adolescents attending school were studied. Fifty Maori and 50 pakeha subjects in each sample (urban and rural) were drawn from the same secondary schools and were matched individually on the basis of grade, course, ability group, and father's occupation. The purpose of using matched groups of Maori and pakeha pupils and both urban and rural samples was to distinguish between distinctively Maori personality traits, on the one hand, and traits assimilated from pakeha culture, on the other, and to isolate the effects of Maori culture on personality from the effects induced by the unequal operation of such factors as occupation, social class status, urban-rural residence, and academic aptitude on Maori and pakeha populations. Because of generally higher pakeha than Maori IQs in the same ability groupings and the unavailability of sufficient subjects, it was not possible to match subjects on the basis of IQ. Separate matchings were conducted for the Maori-pakeha and the urban-rural comparisons.

The procedures and instruments used in this study included: (a) structured academic and vocational interviews with pupils; (b) Test of Occupa-

tional Prestige Needs (3); (c) Achievement Imagery Test (5); (d) Vocational Tenacity Test (3); (e) Responsiveness to Prestige Incentives Test (1); (f) teachers' ratings of motivational and aspirational traits; and (g) participant observation at community functions (tribal committee and tribal executive meetings, *huis*,[3] *tangis*,[3] weddings, sports meetings, birthday parties, etc.), and informal interviews with parents, teachers, Vocational Guidance Officers, Maori Welfare Officers, community leaders, and clergymen.

Since there is no such thing as a "typical" Maori community and since no attempt was made in this study to use a stratified sample representative of the Maori population in New Zealand, the findings may be properly generalized only to Maori communities similar to those used in this research, i.e., to urban provincial centers and to relatively prosperous Maori rural districts with roughly equal numbers of Maori and pakeha inhabitants and better than average race relations. Implications from these findings for the educational and vocational achievement of Maori youth *as a whole* are only tentative and suggestive and would have to be confirmed by research on a more representative sample of Maori adolescents (i.e., drawn from the various main types of Maori districts) before they could be generalized more widely.

The Findings

Matched groups of Maori and pakeha secondary school pupils exhibited a striking measure of over-all similarity in educational and vocational aspirations, underlying motivations for achievement, supportive traits, and perceptions of both prevailing opportunities and family and peer group pressures for achievement. This finding supports the view that many (but by no means all) of the traits commonly regarded as typically Maori are largely reflective of low occupational and social class status, predominantly rural residence, and environmentally stunted verbal intelligence. Some Maori-pakeha differences may have been obscured in part either because of insufficient sensitivity of the measuring instruments or because of their transparency to the subjects. This possibility, however, is discounted both by the adequate range of variability obtained for the various instruments and by the substantial degree of intercultural uniformity found in relation to those measures where transparency was impossible. In fact, obtained Maori-pakeha differences are probably overestimates of true differences since the pakeha sample was favored by several factors that could not be controlled by matching.

The major finding of this study was the much greater similarity between Maori and pakeha pupils with respect to their expressed educational and vocational aspirations than with respect to those factors necessary for the internalization and implementation of these aspirations, namely, underlying

[3] *hui*—a large Maori gathering; *tangi*—ceremonial Maori mourning rites.

needs and motivations for achievement, supportive traits, and perceived pressures and opportunities for academic and occupational success. In terms of over-all magnitude and prestigefulness of academic and vocational aspirations, Maori and pakeha samples were not significantly different. But although the stated aspirations of Maori pupils are not later internalized and implemented to the same extent as are those of pakeha pupils—because of the absence of suitable cultural, family, and peer group pressures and supports—there was no reason to believe that they were insincere or did not correspond to genuine intentions at the time that they were reported. Maori aspirations were especially expansive in relation to more remote goals (i.e., School Certificate, university, hypothetical vocational ambitions) unconstrained by current reality considerations and were more restrained in relation to less distant goals, i.e., end of the year marks, improvement of scholastic standing in the class.

Assimilation of pakeha academic and vocational aspirations by Maori pupils—despite inadequate later internalization and implementation—is a datum of tremendous cultural and psychological significance. It constitutes an all-important first step in the taking over of pakeha achievement patterns and is indicative of a degree of acculturation that undoubtedly was not present 20 or even 10 years ago. Maori acculturation has evidently proceeded to the point where it can sustain the generation—if not the implementation—of European educational and occupational ambitions. The development of these aspirations during late childhood and early adolescence is facilitated by considerable contact with the school and with the wider pakeha culture and by relatively poor communication with parents and the Maori adult community. As this communication improves and as Maori adolescents begin to perceive more accurately the lack of strong cultural and family pressures for educational and vocational achievement, their ambitions not only fall far short of realization but are also drastically lowered.

Pakeha pupils had higher occupational prestige needs than Maori pupils and considered vocational achievement a more important life goal.[4] They also gave higher ratings to such factors as prestige, wealth, and advancement as reasons for seeking occupational and academic success. Maori pupils, on the other hand, were more highly motivated by task-oriented ("interest in studies," "liking job") and group welfare ("to help others") considerations. Urban pakeha pupils were more highly rated by teachers than their Maori counterparts on such supportive traits as persistence, attentiveness, conscientiousness, planfulness, and initiation of activity; and in the rural school pakeha pupils did more studying for examinations.

Because of poor parent-child communication in our Maori sample, obtained Maori-pakeha differences in *perceived* family pressures and opportunities for educational and vocational achievement were less striking than those actually prevailing and noted in the course of participant observation

[4] All differences reported in this paper were significant at the .05 level of confidence or better.

and informal interviews. Nevertheless, pakeha parents were still perceived as demanding higher school marks than Maori parents and as prodding more about homework. Pakeha pupils were more optimistic than their Maori age-mates about the chances of achieving occupational success and saw fewer obstacles in their path. Another indication of defective parent-child communication was the fact that only about one quarter of the Maori pupils had any insight into the existence of blatant anti-Maori discriminatory practices in employment.

As predicted, Maori-pakeha differences were greater in the urban than in the rural environment. Despite being more highly acculturated than rural Maoris, urban Maoris have not yet assimilated the urban pakeha pattern as completely as rural Maoris have assimilated the rural pakeha pattern. This, of course, is largely a function of the recency of Maori migration to the cities. In addition to the fact that rural life is much closer than urban to his indigenous pre-pakeha culture, the Maori has had at least a hundred years more time in accustoming himself to it.

With progressive urbanization of the Maori population, urban-rural differences among Maori adolescent pupils are becoming increasingly more important, even though these differences in aspirational and motivational traits are currently less conspicuous than corresponding uniformities. Many factors undoubtedly contributed to the finding that Maori pupils in our urban sample were closer to pakeha norms in these traits than were rural Maori pupils. These factors include selective migration to the city of vocationally more ambitious youth, the greater acculturation of long-standing urban residents, the difficulty of practicing Maori cultural values in the city, and less exposure to traditional practices and to the influence of Maori elders and of the Maori peer group.

Differences between urban and rural Maori pupils were most marked with respect to expressed educational and vocational aspirations, prestige motivation, desire for occupational success, and supportive traits. Urban pupils strove more for top marks and were more desirous of improving their class standing, had higher occupational prestige needs, made higher scores on the Achievement Imagery Test, and valued occupational achievement more highly. They also spent more time on homework and in studying for examinations. Although they perceived more obstacles in their path, they were more hopeful of eventually achieving vocational success. Consistent urban-rural differences were not found in relation to task-oriented and group welfare motivation and perceived family pressures for achievement. It seems, therefore, that urban surroundings may encourage pakeha aspirations, motivations, and supportive traits without immediately attenuating Maori motivations. Since Maori parents were only recent arrivals to the city, they apparently did not play an important role in transmitting pakeha achievement patterns to their children; they were not perceived by the latter as demanding higher educational and vocational achievement than were the parents of rural pupils. Urban parents, however, gave the impression

of being less authoritarian than their rural counterparts, seemed to have less contact with and control over their children, and generally played a less important role in determining their children's choice of career.

With the progressive advance of Maori acculturation and migration to urban centers, the increasing importance of urban-rural differences among the Maori people has been paralleled by a corresponding decrease in the magnitude of Maori-pakeha differences. A credible hypothesis supported by our data would be that Maori acculturation with respect to aspirational patterns has proceeded to the point where, in rural areas, Maori and pakeha pupils are more similar to each other than are urban and rural Maori adolescents. In the city, however, Maori youth are, *relatively speaking,* not quite as far along on the acculturation continuum: Maori and pakeha pupils are still more different from each other than are matched urban and rural pupils within the Maori population.

Factors Affecting Vocational Achievement

Parental Influences

Maori parents are less sophisticated than their pakeha counterparts about vocational matters and are accordingly less capable of assisting their children with appropriate information, advice, and guidance. Even if they were more capable in these respects, however, they would still be handicapped in transmitting helpful insights from their own life experience because of the conspicuous estrangement and lack of adequate communication existing between them and their children, especially in urban centers. In view of their smaller incomes and larger families, Maori parents are also more reluctant to commit themselves to supporting plans requiring long-term vocational preparation. Many are greatly confused about the standards of behavior they should properly expect and demand from their adolescent children, and others are ambivalent about letting the latter leave home in search of better vocational opportunities.

Maori parents tend to adopt more permissive and laissez-faire attitudes than pakeha parents toward their children's vocational careers. Despite occasional and inconsistent displays of authoritarianism in this regard, they are usually content to let them drift. They apply fewer coercive pressures and extend less support and encouragement in relation to the long-term occupational ambitions of their children. Their own values concerning vocational achievement and the example they set their children also tend to encourage the adoption of a short-term view. In practice, they make few demands for the deferment of immediate hedonistic satisfactions and for the internalization of supportive traits consistent with high academic and occupational attainment. It is small wonder, therefore, that Maori adolescents are unable to resist the lure of immediate "big money" in unskilled laboring jobs. Although they tend in early adolescence to lack adequate insight into their parents' lack of genuine commitment to educational and vocational

achievement, Maori pupils in our sample perceived fewer family pressures regarding these matters than did pakeha pupils.

Peer Group Influences

Maori pupils also receive less encouragement from their peers than pakeha pupils do to strive for vocational achievement. Not only is occupational success less highly valued in the Maori than in the pakeha peer culture, but the greater availability of *derived status*—based solely on membership in and intrinsic acceptance by the group—also removes much of the incentive for seeking *primary status* based on individual competence and performance. In districts where community morale is low and juvenile delinquency flourishes, vocational achievement tends to be negatively sanctioned.

Cultural Influences

Greater emphasis on derived than on primary status and on the task-oriented and group welfare features of primary status (rather than on its self-aggrandizing aspects) is generally characteristic of Maori culture. Less concerned with achieving occupational prestige, the Maori is less willing than the pakeha to internalize traits important for implementing achievement goals, i.e., to practice self-denial and self-discipline and to persevere in the face of adversity. Valuing personal relationships, derived status, and kinship ties above material possessions and occupational prestige, helpfulness, generosity, hospitality, and sociability count for more in his eyes than punctuality, thrift, and methodicalness.

Many Maori attitudes toward work, stemming both from his indigenous and current value system as well as from his pre-pakeha organization of economic life, impede his vocational adjustment. In the first place, he is less accustomed than the pakeha to regular and steady employment. Second, he finds dull, monotonous labor less congenial than the pakeha does. Third, the concept of thrift for vocational or economic purposes is more foreign to him. Fourth, he has greater ties of kinship and sentiment to the locality of his birth and is less eager to migrate to other districts. Fifth, he does not value work as an end in itself, as a badge of respectability, or as a means of getting on in the world. Last, he is more dependent than the pakeha on the psychological support of an intimate group in his work environment.

Another factor limiting the vocational achievement of Maori youth is the relatively low occupational status and morale of Maori adults. Young people lack the encouragement of a tradition and a high current standard of vocational accomplishment in the ethnic group. They are also denied the practical benefits of guidance and financial backing that would follow from the existence of such a standard and tradition. On the other hand, they are discouraged by the marginal economic position of their elders, by social demoralization (i.e., wretched housing and sanitation, alcoholism, apathy,

neglect of children) in many communities, and by the institutionalization of a period of occupational drifting during late adolescent and early adult life. Compounding this situation is the overly casual, "She'll be right" attitude that is generally rampant in New Zealand and the absence of sufficient incentive for a young person to acquire a trade or profession. This is largely a function of an undifferentiated national wage scale which places a tremendous premium on unskilled manual labor.

Racial Prejudice

Finally, discriminatory employment practices deriving from color prejudice and from the popular stereotype of the Maori as lazy, undependable, and capable of only rough, manual labor tend to bar Maoris from many higher status occupations in banks, commercial establishments, private offices, shops, and skilled trades. Maori boys desiring apprenticeships are usually required to migrate to the principal centers where they face further discrimination in obtaining suitable board and lodging. The denial of equal occupational opportunity to Maori youth constitutes the most serious and prognostically least hopeful factor impeding Maori vocational achievement, since color prejudice is not only deeply ingrained and increasing in the pakeha population, but its existence is also categorically denied by both the people and Government of New Zealand.

Factors Affecting Maori Educational Achievement

Home Influences

Despite their high educational aspirations, incomparably fewer Maori than pakeha pupils take or pass the School Certificate Examination, enter the upper grades of post-primary school, attend the university, or obtain a university degree. Home factors are largely responsible for this situation. Many Maori parents have had little schooling themselves and hence are unable to appreciate its value or see much point in it. Although they accept the necessity for post-primary education, they do not provide active, wholehearted support for high level academic performance by demanding conscientious study and regular attendance from their children.

Maori pupils tend to lead two distinct lives—one at school and one at home in the *pa*.[5] There is little carry-over from school to home, but probably much more in the reverse direction. Conflict between home and school standards exists until middle adolescence and is resolved by the dichotomization of behavior: each standard prevails in its own setting. Thereafter, parental values, reinforced by increased contact with the Maori adult community, tend to predominate over the influence exerted by the school and the wider pakeha culture.

In addition to the fact that Maori parents are less vitally concerned with their children's educational achievement than are pakeha parents, they are

[5] *pa*—a nucleated Maori settlement or village.

less capable of helping them with their lessons. Because of their larger families, they also have less time to do so. Living more frequently in outlying rural areas, they are less able than pakeha parents to consult with headmaster and teachers. Divided responsibility for children, because of the common Maori practice of adoption and the greater informality and irregularity of marital arrangements, further compounds this situation.

Keeping a large family of children in secondary school constitutes a heavy economic burden on Maori parents in view of their low per capita income and the substantial hidden costs of "free" education. Maori pupils have more onerous household, dairying, and gardening chores to perform than their pakeha classmates and seldom have a quiet place in which to do their homework. Their parents may also remove them to another district during the shearing season. They are further handicapped by inadequate lighting and late hour social activities in the home, and frequently by serious malnutrition.

Cultural Influences

Maori cultural values regarding achievement have had a less adverse effect on the educational than on the vocational accomplishments of Maori youth. In the first place, acculturative progress has been greater in the educational than in the vocational sphere. Second, since motivations for educational achievement are referable to the less remote future, they are influenced less by the values of the peer group and of the adult Maori community. But, although Maori intellectual traditions and traditional respect for learning have been seriously eroded, the loss has not been adequately compensated for by a corresponding acquisition of European intellectual values and pursuits. The modern Maori tends to be distrustful of book learning, intellectuals, and higher education. This attitude is in part a reflection of residual disenchantment with pakeha education stemming from the Maori Wars and subsequent withdrawal.

Other limiting factors in the current cultural situation of the Maori include the relatively low educational attainment of most Maori adults, the absence of a strong academic tradition, residence in remote areas where there are only district high schools or no post-primary facilities whatsoever, and serious staffing problems in most Maori district high schools. But, since the percentage of Maoris attending secondary schools is progressively increasing, many of these problems will gradually disappear.

Adjustive Difficulties

Coming as they frequently do from small rural schools where they are in the majority, know all of their fellow-pupils, and enjoy intimate personal relationships with their teachers, Maori pupils experience more difficulties than their pakeha classmates in adjusting to the new secondary school environment. Less well prepared academically for post-primary studies and less accustomed to impersonal and authoritarian teacher attitudes, they often

tend to develop serious feelings of personal inadequacy. In many secondary schools, also, teachers adopt covertly antagonistic and overtly patronizing attitudes toward Maori pupils. They accept them on sufferance only, feeling that it is a waste of time, effort, and money to educate Maoris since they "only go back to the mat." Hence, they offer the latter little encouragement to remain in school beyond the minimal leaving age.

Stunting of Verbal Intelligence

Maori pupils are undoubtedly handicapped in academic achievement by a lower average level of intellectual functioning than is characteristic of comparable pakeha pupils. In both our urban and rural samples, particularly the latter, Maori pupils had significantly lower Otis IQs than their pakeha classmates. They were also retarded in arithmetic, English usage, and ability to handle abstract concepts. This retardation is attributable to two main factors: (a) the status of the Maori people as a generally underprivileged lower-class minority group with unusually large families and (b) special disabilities associated with problems of acculturation. Pointing to the environmental rather than to the genic origin of these differences is the fact that urban IQs were higher than rural IQs in both Maori and pakeha samples and that the Maori-pakeha difference was significantly lower in the urban than in the rural sample. The extreme intellectual impoverishment of the Maori home *over and above* its rural or lower social class status reflects the poor standard of both Maori and English spoken in the home and the general lack of books, magazines, and stimulating conversation.

The low average level of intellectual functioning among Maori pupils cannot be dismissed simply as a function of test bias or of "language difficulty." The inability to handle verbal concepts that leads to low intelligence test scores is undoubtedly of environmental origin; nevertheless, it renders individuals no more competent to handle analogous verbal materials in educational and vocational situations than if it were hereditary in origin.

Bilingualism

The widely held view that the bilingualism of the Maori child is responsible for his educational retardation is not adequately supported by research data. Competent observers have failed to note any negative relationship between bilingualism, on the one hand, and school marks or passes on School Certificate English, on the other. Cook Islanders, Fijians, and Samoans tend to be more bilingual than Maoris and yet are academically more successful in New Zealand secondary schools and universities. Although rigorous research is urgently needed in this area, it may be tentatively concluded that the language retardation of Maori secondary school pupils is attributable to the poor standard of English spoken in the home and to the generally impoverished intellectual environment in Maori rural districts rather than to bilingualism per se. When Maori children grow up in the intellectually more stimulating urban environment, mental and language retardation is markedly reduced.

Sources of Maori-Pakeha Differences in Motivational Traits

The ultimate source of Maori-pakeha differences in adolescent personality development may be attributed to two core aspects of traditional Maori value structure dealing with the basis of self-esteem: (a) greater emphasis on *derived status* throughout the entire life cycle of the individual and (b) less emphasis on the self-aggrandizing aspects and greater emphasis on task- and group-oriented aspects of *primary status*. The Maori of old highly valued primary status as a proper source of self-esteem and fostered achievement motivation in youth by encouraging appropriate supportive traits (e.g., persistence, enterprise, organizational ability). But the self-aggrandizing features of primary status (i.e., personal ambition, individualism, competitiveness, compulsive need to work, relentless anxiety-driven drives to succeed), although not unknown, were not as highly emphasized as in pakeha society. Greater stress was laid on mastery of skills for its socioeconomic importance, on pride of craftsmanship, and on the personal satisfactions of meritorious accomplishment; on kinship obligations and on *intertribal* competition; and on the satisfactions associated with working together in an intimate, personal context of reciprocal psychological support. These characteristics of primary status and the continued importance of derived status engendered and made valuable in turn traits of mutual helpfulness and cooperative effort in bearing economic burdens, generosity, hospitality, and concern for the welfare of kinsmen. Because of the greater availability of derived status, the attainment of primary status was a less compelling necessity for the maintenance of self-esteem.

This cultural orientation toward status and self-esteem was modified by the Maori's subsequent acculturative history. Several factors militated against acceptance of the pakeha achievement pattern. In the first place, lingering resentment toward the pakeha and disillusionment in pakeha values, motives, and practices fostered an attitude of rejecting pakeha ways simply because they were pakeha. Second, it was difficult for the task- and group-oriented Maori to accept the self-aggrandizing aspects of pakeha primary status and the supportive traits that went with it and to grow accustomed to pakeha working conditions. Third, he was handicapped in utilizing pakeha channels to primary status by lack of education and training for pakeha jobs, by lack of familial indoctrination in pakeha values, by general unfamiliarity with pakeha vocational opportunities, and by discriminatory attitudes on the part of many pakehas. Last, the residual vitality of the traditional value system created basic needs and provided basic satisfactions for those needs which the pakeha pattern could not easily gratify. On the other hand, traditional channels for implementing the Maori pattern of primary status, and the associated social organization and leadership devices, were no longer functional; and any type of constructive achievement was greatly hampered by the widespread demoralization, lassitude, and feelings of hopelessness and impending cultural obliteration that gripped the

Maori people in the first three decades following the civil wars. Hence, the most acceptable solution for most individuals seemed to lie in de-emphasizing the importance of *all kinds* of primary status and achievement motivation and in making exaggerated use of the psychological support offered by derived status.

Distinctive cultural expectations with respect to primary and derived status also influenced indirectly the nature of adolescent aspirational patterns by determining along parallel lines the kinds of childhood and adolescent role and status experience made available to children. Relevant to the Maori situation were such factors as habituation to procurement of the major portion of derived status from group rather than from parental sources, and hence greater dependence on and conformity to the group; the role of peers and siblings as the major socializing agents during childhood, with a resulting tradition of more equalitarian relationships and reciprocal obligations; no necessity for emancipation from parents and transference of primary loyalties to peers during adolescence, since early dependent relationships to parents were weak or nonexistent; less pressure to repudiate derived status and strive for a great amount and self-aggrandizing form of primary status; and less discontinuity in general between childhood and adolescence. Hence, reinforcing the direct influence of the cultural ideology on the types of aspirations adolescents internalized was actual experience with particular kinds of status satisfactions and equalitarian relationships in the peer group —experience that was consonant with the cultural value system and therefore sanctioned by it.

The aspirational and motivational traits of Maori adolescents are undoubtedly influenced by the fact that Maoris are predominantly members of lower social class groups. By using matching procedures that controlled for social class, however, it was possible to eliminate the effects of relative social class status on our Maori-pakeha differences. Intelligence is another variable that is significantly related to educational and occupational aspirations, but the small Maori enrollment in our two schools precluded the possibility of matching pupils on this basis. It is extremely unlikely, however, that our Maori-pakeha differences in aspirational traits would have been materially reduced if it had been possible to adopt this procedure.

Conclusion: The Transmission of Maori Aspirational and Motivational Traits

In accounting for the transmission of the distinctive Maori pattern of aspirational, motivational, and supportive traits from one generation to the next, our logical point of departure must lie with the heritage of pervasive and interlocking cultural values regarding primary and derived status that functioned in the pre-pakeha Maori culture and was subsequently modified by the historical experience of acculturation. As a result of the cumulative effects of (a) recurrent exposure to these achievement values and observa-

tion of culturally stereotyped role models and (b) actual participation during childhood and adolescence in analogous types of role and status experience, this ideology is gradually internalized by the developing individual.

From our data it was clear that young Maori adolescents in our urban and rural samples had for the most part successfully assimilated the pakeha pattern of educational and vocational aspiration. These aspirations reflected both the prevailing pakeha achievement ideology to which they were exposed in school and in the wider culture, as well as the expressed but superficial desires of their parents. The latter, however, basically identified with the Maori orientation toward primary and derived status and generally had no deep emotional commitment to pakeha achievement values. Hence, they did not *really* encourage the implementation of these aspirations by voicing appropriate expectations, making unequivocal demands, dispensing suitable rewards and punishments, and insisting on the development of the necessary supportive traits. But, because of poor communication between parents and children, this situation was not clearly perceived by Maori secondary school pupils. Thus, during early adolescence, although they frequently reverted to parental standards in the home environment, the influence of the school and of pakeha culture generally tended to predominate in the development of educational and vocational aspirations and in the matter of conforming to pakeha work standards.

Later on, however, as relationships and communication with parents and the adult community improve, the influence of Maori cultural values, as mediated through parents and peers, begins to prevail. Educational and vocational aspirations, achievement motivation, and essential supportive traits fail to become adequately internalized; and eventually, as the possibility of implementation progressively recedes, the aspirations are either lowered or abandoned. Concomitantly, Maori adolescents also become progressively more aware of the actual obstacles standing in the way of their vocational success because of pakeha prejudice and discrimination. This perception of the relative unavailability of the promised rewards of self-denial and striving similarly disposes them to abandon or modify their earlier aspirations. Other important factors that contribute to the lack of internalization and implementation of educational and occupational aspirations include traditional Maori attitudes toward work, acute social demoralization in some Maori communities, and the absence of adequate guidance and of traditions of high scholastic and vocational accomplishment in most Maori families.

On the basis of our data it appears likely that significant Maori-pakeha differences in achievement orientation may be reasonably anticipated for at least another generation. They will be gradually obliterated, however, by the increasing urbanization of the Maori people and by progressive improvement both in the cultural level of the Maori home and in the concern of Maori parents for their children's educational and vocational advancement.

The next generation of Maori parents will probably be able to sustain the internalization and implementation as well as the instigation of pakeha aspirations for achievement. Racial discrimination will undoubtedly make it more difficult for Maoris to implement their aspirations; but, depending on the magnitude of the handicap imposed, this situation may either stimulate greater striving, as in the case of the Jews and Greeks in the United States (8), or may promote an attitude of apathy and hopelessness, as is partly true in the case of the American Negro, who often perceives the cards as so overwhelmingly stacked against him that striving seems futile (8). In any event, the achievement ideology of the Maori will certainly reflect his predominantly lower social class status, becoming in time more and more similar to that of the lower-class pakeha.

References

1. Ausubel, D. P. Prestige motivation of gifted children. *Genet. Psychol. Monogr.*, 1951, 43, 53-117.
2. Ausubel, D. P. *Theory and problems of adolescent development.* New York: Grune & Stratton, 1954.
3. Ausubel, D. P., Schiff, H. M., & Zeleny, Marjorie P. Real-life measures of academic and vocational aspirations in adolescents: relation to laboratory measures and adjustment. *Child Develpm.*, 1953, 24, 155-168.
4. Beaglehole, E., & Beaglehole, Pearl. *Some modern Maoris.* Wellington, New Zealand: Council for Educational Research, 1946.
5. McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. *The achievement motive.* New York: Appleton-Century-Crofts, 1953.
6. Mulligan, D. G. *Maori adolescence in Rakau.* Wellington, New Zealand: Dept. of Psychology, Victoria Univer. of Wellington, 1957.
7. Ritchie, J. E. *Basic personality in Rakau.* Wellington, New Zealand: Dept. of Psychology, Victoria Univer. of Wellington, 1956.
8. Rosen, B. C. Race, ethnicity and the achievement syndrome. *Amer. sociol. Rev.*, 1959, 24, 47-60.

THE USE OF VERBAL MEDIATORS IN CONCEPT FORMATION BY RETARDED SUBJECTS AT DIFFERENT INTELLIGENCE LEVELS

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Retarded *Ss*, especially below IQ 65, were found in earlier studies (3, 4) to have little success in reporting a similarity among three words if they did not define at least two of the words in terms of an acceptable abstraction, i.e., a characteristic that applied to all three stimulus words. They performed very well, however, when they did define two or three of the words in common with a possible abstraction. Less extreme results were obtained from retarded *Ss* above IQ 65, their performance being less limited than that of lower IQ *Ss* when they failed to define at least two words in terms of a possible abstraction. However, the earlier findings generally suggested a sharp improvement in the *Ss'* behavior at the point of their using a possible abstraction in defining two of the three stimulus words.

The object of the present study was to test whether a high level of success in reporting a similarity depends, in retarded *Ss* at different IQ levels, upon their defining a threshold number or some constant proportion of the stimulus words in terms of a possible abstraction. For this purpose, stimulus sets, increased in length from three to six words, were presented to retarded *Ss* above and below IQ 65. If a threshold number of words is the important variable, *Ss* should continue to perform well when they define at least two words of the longer sets in terms of a possible abstraction. On the other hand, lengthening the list should be accompanied by a shift in the point of

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sharp improvement if a group's successful performance depends upon some constant proportion, at or near the obtained value of two-thirds, being defined in terms of a possible abstraction.

Subjects

There were, in all, 89 *Ss* of both sexes in the age range of 14 to 20 and the IQ range of 45 to 85. Previously collected data on 23 *Ss* were used to complete the conditions (4).

Procedure

The stimulus words are listed below. The first three words in each six-word set were the test triads in the previous studies, with the final three words being newly added.

1. coffee, tea, cocoa, juice, milk, water
2. bird, airplane, kite, eagle, bee, rocket
3. carrots, peaches, meat, eggs, bread, apple
4. night, cave, closet, shadow, dungeon, tunnel
5. elephant, mountain, whale, ocean, dinosaur, battleship
6. pill, mosquito, pin, ant, pebble, seed

The complete six-word sets were presented to 66 randomly selected *Ss*. Triads consisting only of the three new words in each set were presented to the remaining 23 *Ss*. Since the six-word data were based on both old and new words, previously collected data on the six original triads (the first three words of each set) from 23 *Ss* (4), matched on the basis of IQ, were pooled with the new data to make up the three-word condition.

Each *S* responded to the words in two experimental sessions. In one, the words were presented in sets and *Ss* were asked to name a similarity among the words. In the other session, the words were presented in a random order, one at a time, to be defined by the *Ss*. Within each condition, half of the *Ss*, randomly selected, were first presented the words for definition while the remaining half undertook the abstraction task. In the six-word condition, the old and new materials were randomly presented first and last in order to counterbalance for any response sets that might be produced in the three-word condition.

The *Ss* were divided into two groups, those below IQ 65 and those above IQ 65. The exact specification of groups receiving the two conditions is shown in Table 1. As can be easily seen, *Ss* above IQ 65 (R-high group) are somewhat older than *Ss* below IQ 65 (R-low group) On the basis of other data, there is little reason to believe that the difference in age, apart from the difference in IQ, affected the data.[2]

[2] Personal communication from R. S. Lipman on correlational study of concept attainment.

TABLE 1

AGE AND IQ DATA ON SUBJECTS

Conditions	Below IQ 65 (R-low)		IQ 65 and Above (R-high)	
	Age (mos.)	*IQ*	*Age* (mos.)	*IQ*
Three-word				
Mean	195.7	53.8	211.5	72.2
Standard deviation	29.1	5.9	29.5	4.8
	($N = 30$*)		($N = 16$†)	
Six-word				
Mean	189.5	52.8	207.5	72.5
Standard deviation	22.7	7.0	30.1	6.2
	($N = 40$)		($N = 26$)	

* Includes data on 15 *Ss* randomly selected from R-low group in a previous study (4).
† Includes data on 8 *Ss* randomly selected from R-high group in a previous study (4).

SCORING

The scoring and and tabulation of the responses has been described in a previous study (4). Briefly, the responses were scored to determine whether the percentage of correct abstractions increased as the number of words defined in common increased. For example, if *S* responded to the triad "elephant," "mountain," and "whale" with "They are all big," then his definition of these words would be examined for the presence of "big" or one of its synonyms. If *S* failed to report a similarity among a set of words, then the definitions were examined for characteristics that could serve as an acceptable similarity for the set.[3] Thus, *S*'s response to each set of words was scored in two ways: first, as to whether he correctly attained the similarity, and second, as to the number of words defined in terms of the similarity.

A special method of tabulation, previously described (4), was used in pooling the *Ss*' data. In both the three- and six-word conditions, the *Ss*' responses to the six sets of words in the abstraction session were plotted as points according to the number of words defined in common with an acceptable abstraction. Because each *S* did not contribute equally to each point, or even contribute to all points, it was impossible to treat the data as points based on correlated scores; therefore, the most useful form for the data was to have the scores for a group at any one point be independent. For this purpose, a single averaged score was taken for each *S* contributing

[3] An acceptable similarity could be any property that was generally applicable to each of the presented words. Excluded were properties that might be very broadly applied to most nouns, as, for example, being "things" or being "useful."

to a point no matter whether he defined one, two, or all six sets of words with that number of definitions containing a possible abstraction. Briefly, the main limitation of this method of tabulation is that comparisons within IQ groups between points, and analysis of variance techniques required by such comparisons, cannot be made because they would involve both correlated and independent measures.

To test the hypothesis that defining some constant proportion of the words in terms of a possible abstraction was the requisite for success in the abstraction task, the six-word data were retabulated for comparison with the three-word data. Responses at points 1 and 2 in the six-word data were pooled and considered to represent roughly the same proportion as point 1 in the three-word data, and so on, responses at successive pairs of points in the six-word data being pooled as equivalent to successive points in the three-word data. As in the earlier described tabulation, equal weight was given to each *S*'s contribution to a point. To aid the reader, the number of cases falling at each point is shown in Table 2.

TABLE 2

NUMBER OF SUBJECTS CONTRIBUTING TO POINTS IN FIGURES

	Three-word Condition		*Six-word Condition*		*Retabulated Six-word Condition*	
P Points	R-low $N=30$	R-high $N=16$	R-low $N=40$	R-high $N=26$	R-low $N=40$	R-high $N=26$
0	30	15	29	13	29	13
1	16	12	26	14	34*	19*
2	15	13	17	13	27†	21†
3	27	13	13	15	39‡	23‡
4			19	14		
5			25	17		
6			29	16		

* Pooled responses of points 1 and 2.
† Pooled responses of points 3 and 4.
‡ Pooled responses of points 5 and 6.

RESULTS

One method of testing between the alternatives of a threshold number or some constant proportion being a requisite for correctly reporting similarities is to plot percentage of success in the three- and six-word conditions, first, against the number of words and, second, against the proportion of words defined in terms of a possible abstraction. The first of these methods of displaying the data was adopted for Figure 1 and the second for Figure 2. Since *S*s from each of two IQ levels were subjected to the two conditions, there are, in all, four functions in each graph.

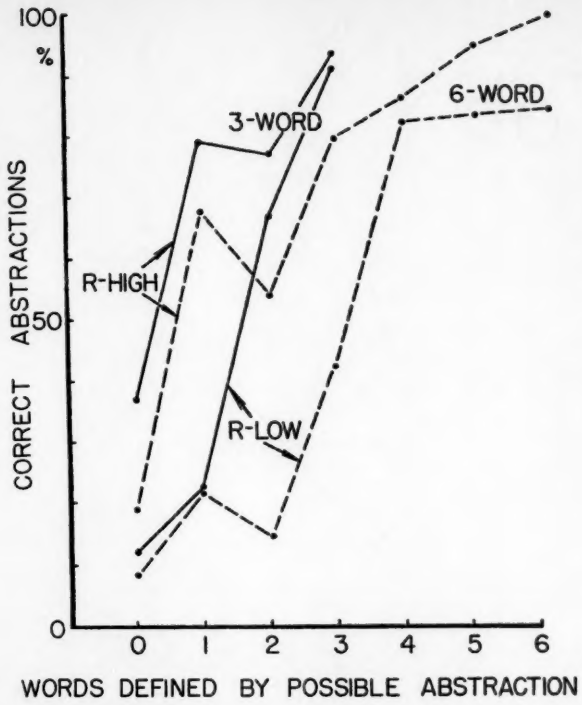

FIGURE 1—Relation of percentage of correct abstractions to the number of stimulus words defined by an acceptable abstraction.

If the threshold number hypothesis were true, then *Ss* at a given IQ level should show a relatively high level of performance under both conditions at the same point (2) in Figure 1. Clearly, the performance of the R-low *Ss* fails to support this hypothesis. Their performance in the three-word condition achieves a high level at point 2, as expected, but they fail to do well in the six-word condition if they do not define at least four words in common with a possible abstraction. The R-high *Ss* show, under both conditions, first rapid and then slow improvement with increases in the number of words defined in common with an acceptable abstraction. Thus, their data suggest the presence of a concept threshold, not at point 2, as hypothesized, but rather at point 1.

As described in the section devoted to scoring, the six-word data were retabulated to yield four points that represent roughly the same proportions

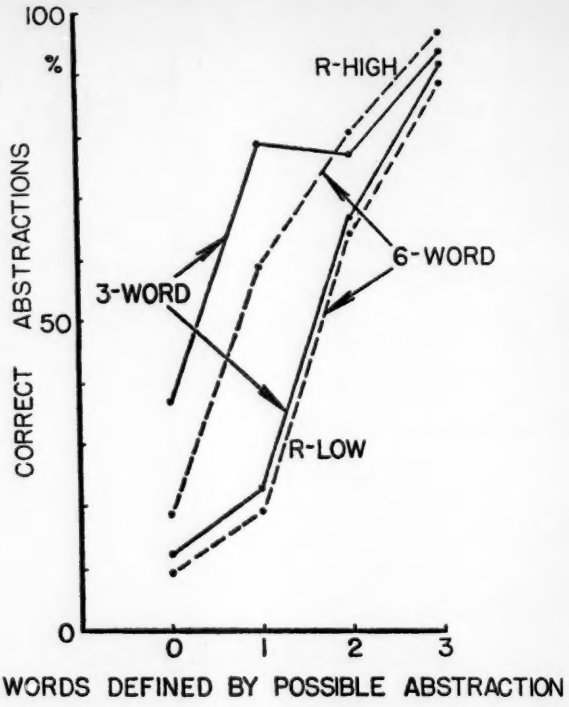

FIGURE 2—Relation of percentage of correct abstractions to equal proportions of words defined by an acceptable abstraction. In this figure, the three-word data were plotted against number of words defined by possible abstraction while the six-word were retabulated, as described in text, to give points that represent roughly the same proportions of the longer list.

of the six-word sets as the four points in the three-word condition. If some constant proportion of the presented words must be defined in common for *Ss* to perform the abstraction task well, then the transformed six-word function should show a good fit to the three-word functions. Figure 2 shows that comparable points in the two conditions nearly coincide for R-low *Ss*. The data, therefore, support the view that defining a constant fraction of the words in common with an acceptable abstraction is the requisite for good performance in R-low *Ss*.

Although there is little support for either of the alternative hypotheses in the R-high data, it is possible to raise the question of whether the differ-

ences between the three- and six-word conditions for R-high *Ss* are minimized more in Figure 1 or Figure 2. The more sensible choice is probably Figure 1 in that there is a rapid rise at point 1 in both conditions. That is to say, R-high *Ss* appear to function more in line with a threshold number hypothesis than with the constant proportion hypothesis. In this case, however, the requisite number seems to be one word defined in common with a possible abstraction.

TABLE 3

THE CHANCE OCCURRENCE OF DIFFERENCES EQUAL TO OR LARGER THAN THOSE OBSERVED AT EACH POINT BETWEEN THREE- AND SIX-WORD CONDITIONS *

		POINTS		
Method of Plotting Percentage Correct Abstractions in Two Conditions	0	1	2	3
R-high IQ level				
Equal number of words defined by acceptable abstraction	.36	.61	.32	.52
Equal proportion of words defined by acceptable abstraction ...		.23	.79	.73
R-low IQ level				
Equal number of words defined by acceptable abstraction	.68	.94	.01	.01
Equal proportion of words defined by acceptable abstraction ...		.99	.89	.96

* The *N*s involved in each test can be found in Table 2. Although there is a total of 14 tests, the usual interpretation of multiple tests is unwarranted because the alternative hypotheses require that several tests be significant and other tests reflect negligible differences at the same time.

It is also possible to answer these questions statistically, i.e., to determine whether the three- and six-word conditions for the two IQ groups are more alike when plotted against equal numbers or against equal proportions of words defined in common. The probability of obtaining a chance difference equal to or greater than the obtained difference is given in Table 3. The statistical tests were made by the Mann-Whitney U test, which allows a convenient estimate of an outcome's probability whenever both groups contain eight or more cases (5).

The probability values in Table 3 show that there is little difference between the three-word data and the retabulated six-word data of the R-low subjects (Fig. 2), the p values being near or greater than .90. At the same time, the two conditions do seem significantly different at points 2 and 3 when percentage correct is plotted against equal numbers of words defined by an acceptable abstraction (Fig. 1). In general, the R-high data are more difficult to interpret since the differences between conditions are not associated with a pattern of high and low probabilities that would support either of the alternative hypotheses.

Discussion

S-R theorists usually assume that the complex equivalences and distinctions found in conceptual behavior are mediated by implicit responses obeying behavioral laws. In the main, empirical support for this view has come from studies of the effect of stimulus predifferentiation, i.e., the training of acquired similarity and distinctiveness, on subsequent conceptual tasks (2). A second approach, that of relating conceptual performance to the presence of suitable mediators, has been less explored. Prior to the present series of studies on retarded *Ss*, the use of this approach has been confined to an informal attempt to explain Heidbreder's order for the difficulty of concepts (6) and to the incidental use of a related technique to show the validity of a scaling method for verbal materials (7).

The correlating of conceptual performance with the presence of mediating responses is complicated by several problems. Eliciting associates to stimulus materials is time consuming for retarded *Ss*, and therefore, hardly feasible for normal or superior adult *Ss* usually available to investigators. Another restriction on this approach with more able *Ss* is the problem of obtaining moderately difficult material in which it is possible to easily identify possible mediators. For example, mediators for the materials used in this study can be readily identified but, needless to say, these materials would be inappropriate for intelligent *Ss*.

Indirectly, such difficulties, in conjunction with the normal objectives of exploratory research, have limited these attempts to analyze the similarities task. The usual statistical techniques for dealing with functions apply only to situations in which there are either correlated or independent measures. The means of obtaining data in one or the other of these forms, i.e., by waiting to obtain a large number of *Ss* that contribute to every point or by giving a large number of different triads to either an equally large number of *Ss* or to a single S, were quite impractical. The results obtained, granted the limitations of the design, now warrant the close study of individual *Ss* for the purpose of better determining the statistical properties of these responses.

Thus far, the main finding is that R-low *Ss* must define a constant proportion of the presented words in common with an acceptable abstraction to perform well at the abstraction task. One might see an analogue in this outcome to Estes' assumption that response occurrence depends upon the proportion of the stimulus sample conditioned to the response (1). In information theory terms, the outcome may be viewed as showing that available verbal associates must be constant as an information source for R-low to report similarities.

The R-high data, being less easily interpreted, furnish an important reason for a closer examination of the behavior of individual *Ss*. In addition, there remains the untested possibility that the form of the function may vary with the relative difficulty of the material in relation to the ability

of the *Ss*. That is to say, more intelligent retarded and normal *Ss* may perform with more difficult material like the R-low *Ss*. For this purpose, new materials are currently being standardized on normal *Ss*.

Summary

The study attempted to determine whether retarded *Ss*' performance in reporting similarities depended upon their defining a threshold number or some constant proportion of the presented stimulus words in terms of a suitable similarity for the entire set of presented words. These alternatives were tested by having *Ss* respond to three- and six-word sets of stimulus words.

The results were separately considered for *Ss* of IQ below 65 and subjects of IQ of 65 and above. *Ss* in the lower IQ range have little success unless they define approximately two-thirds of the words in terms of a possible abstraction. The results for the higher IQ *Ss* do not clearly support either hypothesis.

References

1. Estes, W. K. Toward a statistical theory of learning. *Psychol. Rev.*, 1950, 57, 94-107.
2. Goss, A. E. Mediating responses and concept formation. Paper read at symposium "Mediating processes in transfer," Amer. Psychol. Ass., Washington, September, 1958.
3. Griffith, B. C., & Spitz, H. H. Some relationships between abstraction and word meaning in retarded adolescents. *Amer. J. ment. Def.*, 1958, 63, 247-251.
4. Griffiths, B. C., Spitz, H. H., & Lipman, R. S. Verbal mediation and concept formation in retarded and normal subjects. *J. exp. Psychol.*, 1959, 58, 247-251.
5. Mann, H. B., & Whitney, D. R. On a test of whether one or two random variables is stochastically larger than the other. *Ann. Math. Statist.*, 1947, 18, 50-60.
6. Osgood, C. E. *Method and theory in experimental psychology*. New York: Oxford Univer. Press, 1953.
7. Underwood, B. J., & Richardson, J. Some verbal materials for the study of concept formation. *Psychol. Bull.*, 1956, 53, 84-95.

A NONVERBAL TECHNIQUE FOR THE ASSESSMENT OF AGGRESSION IN CHILDREN

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The paper is a preliminary report of the construction and partial validation of a nonverbal test designed to assess aggressive behavior in children. The test is of the multiple choice variety, making use of cartoons for both the stimulus patterns and the response alternatives.

Even a cursory review of the literature shows little evidence for a linear relationship between aggressiveness on projective tests and aggressiveness in overt behavior (1, 9, 14, 20, 21, 23). Several studies indicate, however, that if both the aggressive motive and the factors inhibiting its expression are estimated from the content of the projective test, it is possible to make predictions about overt behavior (18, 19, 23, 24). The cartoon test is designed specifically to tap the aggressive response dispositions and the inhibitory mechanisms used to control it.

The stimulus cards are designed to picture a highly frustrating situation. The cues are pertinent to real life situations thought to have drive arousing properties for children, such as conflict with siblings, attack by another child, and rejection by a group of peers.

As in real life, the test cues elicit a hierarchy of response dispositions for each individual. These responses range from intense aggression in some individuals to complete denial in others. If in the past the child has associated punishment, or anxiety about punishment, with direct aggression, it is likely that the child will avoid making this kind of response. In keeping with the Hullian tradition, Dollard, Doob, Miller, Mowrer, and Sears (5) have postulated a gradient of frustration relevant responses which might be emitted. For example, if the child is afraid that physical combat will be punished, he might choose a response such as teasing that will be satisfying but invoke punishment less frequently. To some extent, then, the child's expectancies about punishment will determine which response

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is emitted on the response generalization gradient. The test is in many respects a direct translation of the classic frustration-aggression model proposed by Dollard *et al.* (5) and the later addendum by Miller (13). In keeping with the model, it is postulated that the anxiety inherent in the negative expectancy gives rise to the types of avoidance responses commonly labeled as "ego mechanisms." To some extent the avoidance responses translated into the cartoon media for this test are similar to those outlined in the paper by Miller (13); the remaining are logical extrapolations from garden variety clinical concepts.

Description of Test

The test requires no verbal response from the subject. Cartoons are used both as stimuli and as response alternatives. There are 12 stimulus cards, each with its set of alternatives. As three of these cards differ in design and intent from the main body of the test, they will be described in a later section. Each of the 12 stimulus cards consists of a strip of four individual cartoons mounted on an 8 by 12 inch card. Three stimulus cards show a boy being attacked, three cards portray rejection by a group of peers, and three show difficulty with siblings or parents. The stimulus cartoon sequences are made as striking as possible to maximize the amount of aggressive fantasy produced. Recent publications by Kagan (12) and Stone (24) demonstrate that the more aggressive the stimuli the better the discrimination. In keeping with the findings of Pastore (15), and more recently Cohen (4), the frustration portrayed on the stimulus card was made as arbitrary as possible. The instructions read to the child by the examiner were also designed to intensify the cues usually associated with a frustrating state.

After the child has been presented with the stimulus card and told the nature of the activity taking place, he is given six additional cartoons, each mounted on a 3 by 5 inch card. Each of these cartoons represents a technique for dealing with frustration. The order in which the cards are presented has been randomized. From the set of response cards, the subject selects two cartoons which show what the boy might do in this situation.

One response cartoon portrays an *overreaction* to the frustrating situation. For instance, the boy is portrayed whirling his opponent above his head or striking the other boy with a baseball bat. This type of response is labeled *uncontrolled counter aggression* (UCA). A second cartoon shows the child retaliating in a socially appropriate fashion, *controlled counter aggression* (CCA). A third cartoon shows a child expressing his feelings by attacking some less dangerous aspect of the situation, *displacement* (Dp). For example, a card shows the child destroying an object such as a toy which belongs to the frustrating agent. These types of response indicate that the stimulus cues are accompanied by an aggressive response disposition.

As already indicated, frustration and the response, aggression, may be associated with negative expectancies. In an aggressive situation the child may feel that he lacks the skills for successful expression, or perhaps the cues are associated with fears of bodily injury, punishment, or rejection by parents. In the face of this kind of expectancy, a child might simply walk away. One of the alternate choices portrays this solution, *passive* (P). Another solution along the same general dimension would be to seek out a parental figure who could either give support or resolve the conflict. On the test this type of solution is called *dependency* (D). An additional response which is unlikely to elicit punishment is that of appeasing the frustrating agent and attempting to maintain a friendly relationship. One of the test choices portrays the boy putting his arm around his attacker and smiling at him, *reaction formation* (Rf).

These test variables are scored by simply counting the frequency with which a child chooses them on the nine cards. Theoretically, each of the six variables has a range of 0 to 9; the data indicate that for most of them the range is from 0 to 7.

In addition to the model proposed by Dollard *et al.* (5), the work of Sears, Whiting, Nowlis, and Sears (22) and Chasdi and Lawrence (3) has pointed to the child's anticipation of punishment as an important determinant of aggressive behavior. Because of its relevance, three additional stimulus cards and sets of alternatives were added to the test. Each of these stimulus cards shows the boy actively engaged in aggressive activity. The six alternatives to each stimulus card present different degrees of punishment that might be associated with an aggressive response. For example, the alternatives might show the boy losing a fight, being scolded by his parents, being physically punished by an adult, reprimanded by a judge or police officer, and finally being operated on in a hospital. As with the other stimulus cards, the child selects two alternatives. Each set of cards has been assigned weights ranging from one through six. These weights were assigned on the basis of rankings made by a small sample of children. These children ranked each alternative in terms of severity of punishment being represented. The sum of these weights would constitute the score for *punishment* (Pn).

The test takes about 20 minutes to administer. Several examiners who have used the test with both normal and disturbed children report a very enthusiastic reception.

Procedure

A pilot scale was developed on the basis of an item analysis of the data obtained from two groups of disturbed and two groups of normal boys.[1]

[1] The Nebraska Psychiatric Institute supplied both funds and staff assistance to make this phase of development possible. The research was further implemented by USPH grant number M-1889, 1957.

Even though it was possible to make significant predictions about overt aggressive behavior (16), test retest and split half reliabilities were too low to warrant using the test as a measuring instrument (median reliability, .56).

The present report summarizes the efforts to increase the reliability of the test variables and also offer additional evidence for predictive efficiency. The earlier analysis indicated that some of the alternatives did not relate significantly to the response class for which they were intended. These alternatives were replaced by new cards, and three stimulus cards were added with their sets of alternatives. This set of 12 cards constitutes the revised scale which was described earlier in the paper.

The revised scale was administered individually to 80 boys in the public schools of Eugene, Oregon, ranging in age from 6 through 12 years.[2] As in samples used with the earlier scale, each child was rated by his teacher on an eight-point scale for frequency and intensity of aggressive behavior in the classroom. This scale was anchored at four points by behavioral descriptions. The scale is shown below:

Aggressive behavior: this is a composite of the frequency with which a child is fighting, shoving, teasing, or arguing.

almost never asserts self by fighting, shoving, or teasing	if provoked will fight back or argue, tries to avoid it	teases or pushes, occasionally starts fights or arguments	frequently in fights, a good deal of unnecessary shoving, teasing, or arguing

It was not feasible to collect data on the reliability of the teachers' ratings.

On the basis of these data, the revised test was analyzed for internal consistency, split-half reliability, and its relation to overt behavior. In the item analysis, each alternative was correlated with the corrected total score of the variable for which it was designed. Because they did not show the appropriate level of significance, 30 per cent of the alternatives were dropped from further analysis.

Results

Reliability

In view of the limited range for most of the variables, the split-half correlation coefficients were corrected for class index (17). The coefficients presented in Table 1 have been further corrected by the Spearman-Brown formula.

[2] This research was financed by a grant from the Graduate School of the University of Oregon, 1958. The writer gratefully acknowledges the cooperation of the Eugene Public School system.

TABLE 1

ODD-EVEN RELIABILITY COEFFICIENTS*

Test Variable	*r*
Response Disposition	
1. Uncontrolled counter aggression	.72
2. Controlled counter aggression	.54
3. Displacement	.62
Inhibition	
4. Reaction formation	.76
5. Passive	.71
6. Dependency	.51
7. Punishment	.67

* Corrected by Spearman-Brown formula.

These figures represent substantial increases over those reported for an earlier form of the test. It is evident that two of the test variables (controlled counter aggression, dependency), however, require further development before they will be adequate for general use. On the whole, however, the median reliability of .69 compares favorably with that of many of the measuring devices used with children.

Age Differences

Research evidence would lead us to expect that there would be differences between age groups in the kinds of cards chosen. Table 2 presents the average number of choices for each variable in older and younger boys and the significance of the differences between these age groups.

TABLE 2

MEAN NUMBER OF CHOICES BY AGE GROUP

Test Variable	*Ages 6 to 9* ($N=34$)	*Ages 10 to 12* ($N=45$)	*t*
CCA	3.2	3.1	.36
UCA	2.6	1.6	4.00**
Dp	2.7	2.5	.08
Rf	1.7	2.0	1.24
P	1.9	2.0	.09
D	.8	1.3	2.92*
Pn	12.7	13.5	1.35

* p less than .01.
** p less than .001.

Both age groups maintain roughly the same rank order of choices. That is, they tend to choose controlled counter aggression first, displacement second, passivity fourth, and dependency least frequently. There is a tendency for younger children to select the aggressive reactions more frequently than older children; this is significant only for the extremely aggressive responses (UCA). The finding that older children tend to choose the D (dependency) alternative more frequently than younger children was not anticipated from the usual frame of reference taken in considering this variable. Data that will be published at a later time show that children who chose this variable most frequently were observed (by adults) to be those children who handled relationships with adults on a relatively sophisticated level. Both sets of data are in agreement that choices on D indicate maturity rather than immaturity.

Overt Behavior

One criterion which should relate to the test variables is overt aggressive behavior. Earlier in this paper the writer postulated that the best predictions about the overt behavior can be made by combining both aggressive response dispositions and inhibitory variables. Because of the age differences in response to test variables, the predictive data are presented separately by age groups. On the basis of literature cited earlier, one would expect equivocal results in predicting from aggressive response dispositions alone. It is postulated that most of the errors in making such predictions would be in misclassifying the child with a high frequency of aggressive test response by overestimating the aggressiveness of his behavior. That is, we would expect a considerable number of "false positives." Introducing inhibitory variables should lead to significantly better predictions, and the increased efficiency should result primarily from a reduction in the frequency of this type of error.

The data presented in Table 3 offer support for these generalizations. Accuracy was calculated for UCA by dichotomizing the test variables at the median and the criterion ratings at a point standing for frequent aggressive behavior. Accuracy is the percentage of agreement between the test and the criterion in classifying a child either above or below his cutting point.

Predicting behavior from the combined test variables involved a somewhat different process. When both the test variables, UCA and punishment, are dichotomized, four possible patterns arise. On the basis of the frustration-aggression model being used, there would be definite predictions made for each of these combinations. The aggressive child should be characterized by high response disposition and low punishment. The behaviorally nonaggressive child should be characterized by any one of three remaining combinations: frequent aggressive responses and high punishment, nonaggressive responses and either high or low punishment. The significance level of these predictions was calculated by Fisher's exact chi square

TABLE 3

PERCENTAGE ACCURACY OF PREDICTION FOR UNCONTROLLED COUNTER AGGRESSION (UCA) COMBINED WITH PUNISHMENT (Pn)

Scale	*Sample*	*N*	*UCA*	*UCA+Pn*
1958 (revised)	1. Public School			
	Ages 6–9.9	29	58	73*
	Ages 10.0–12 ...	41	58	73*
1957	2. Boys Town			
	Ages 9.0–12.0 ...	29	68	72*
	3. Public School			
	Ages 7–9.0	25	54	76*
	Ages 9.0–11.0 ...	25	52	72

* p less than .05.

technique. For purposes of comparison, Table 3 presents data from normal children based on both an earlier and the revised 1958 scale.

The data indicate that UCA alone gives predictions at a very low level for most samples. However, combining information from UCA and punishment results in consistently higher predictions about concurrent behavior. For the total sample of 70 Oregon boys the increment in predictive efficiency is significant at the .03 level (one-tailed test).[3]

The combination of variables found to be efficient in predicting the aggressive behavior of relatively normal children is not the most effective combination for disturbed children (16). For two samples of disturbed children UCA in combination with Rf generated predictions ranging in accuracy from 74 to 82 per cent, while UCA and punishment gave predictions which were not significantly different from chance. Some caution should be exercised, as these results have not been cross-validated with the revised scale; but the possibility of different patterns being effective for different groups seems to be worth further study.

Although the model presented here would suggest an increment in predictive efficiency when using both types of variable, it would also suggest a reduction in a specific type of error. Table 4 shows the reduction in false positive errors incurred by using the punishment variable in conjunction with UCA.

The data indicate that in every case the drop in such errors is appreciable. These preliminary analyses would suggest that the test is quite successful in identifying a group of boys who may be expected to show aggressive behavior. The major errors involved in prediction by means of the test are in predicting that some children will be passive when in fact they are observed to be aggressive.

[3] Teacher ratings were not available for 10 *Ss*.

TABLE 4

FALSE POSITIVE ERROR IN PREDICTION COMPARING UCA TO UCA COMBINED WITH PUNISHMENT

Scale	*Sample*	*N*	% FALSE POSITIVE ERROR	
			UCA	*UCA+Pn*
1958	1. Public School			
	Ages 6–9.9	29	34	12
	Ages 10.0–12 ...	41	22	5
1957	2. Boys Town			
	Ages 9.0–12.0 ...	29	34	13
	3. Public School			
	Ages 7–9.0	25	29	0
	Ages 9.0–11.0 ...	25	40	8

DISCUSSION

There are a variety of analogues which might be useful for constructing a test for children. These models differ from each other in both procedure and intent. We might, on the one hand, follow the absolute empiricism of factor analysis to organize variates into meaningful constructs. At the opposite extreme, we could follow the lead of techniques such as the Rorschach which have complex rational underpinnings but do not lend themselves readily to empirical verification. The present instrument is, in effect, a compromise between these two positions. As suggested by Holland (10), we might label this a rational-empirical scale. The scale would be categorized as rational to the extent that it is a translation of the frustration-aggression model. It is empirical to the extent that the variables are easily quantifiable and testable.

Most of the data thus far collected deal with the problems of internal consistency, and little real evidence is available attesting to the validity of the constructs. As a practical consideration, a test which identifies aggressive behavior in children is of doubtful value (it would be simpler to ask the teacher or parent). The fact that both the 1957 and the 1958 scales can make significant predictions about concurrent behavior does, however, have implications for meaning that we can attach to the variables, uncontrolled counter aggression and punishment. The other test variables represent separate problems in validation which will be undertaken as soon as the scale satisfies the requirements of internal consistency.

The fact that the predictions made are in keeping with the model offers evidence that there has been at least partial success in translating the model into the test media. However, statements about the success of

this translation should be qualified in some important respects. Dollard *et al.* (5) considered frustration as having some of the characteristics of a drive state or an emotion. Brown and Farber (2) carefully outlined the requirements for viewing frustration as an emotion. The present data, however, do *not* offer supporting evidence for viewing UCA (or any other test variable) as necessarily having drive characteristics. The same predictions could be made by defining the test variables involved as response dispositions (habits) rather than drives.

The difficulties in inferring a drive state by either overt behavioral or test responses have already been outlined by Farber (6). Whether UCA, CCA, and perhaps Dp are assessing a motivating state having both energizing and directing qualities remains an empirical question. It is entirely possible that an aggressive response might be associated with a frustrating state or emotion or with other drive states such as anxiety or hunger. Until further clarification of the role of aggression as a response or a drive state, the writer prefers to label the variables as simply being response dispositions.

Because of the restricted sampling of personality constructs involved, the instrument will probably be of limited value in clinical settings. It would seem likely, however, that it would serve as a research tool in investigating a wide variety of clinical problems. The underlying model would predict, for example, a relationship between certain types of control mechanisms and psychosomatic reactions in children. Conceivably, it might also relate to certain acting out behaviors in disturbed children. The writer's particular interest, however, is in using the instrument as an approach to problems in developmental psychology. It might be useful in the investigation of age and sex differences in children. Even more pertinently, it should show some relationship to parent attitudes and disciplinary practices as they are directed toward the control of the child's behavior.

Even at this preliminary stage of development, the results look promising. It is the general intent of this paper to make the procedure available to other investigators who are concerned with the construction of tests for children or in using the frustration-aggression model. Reproductions of the test are available on microfilm.

Summary

A preliminary, nonverbal test is described which identifies two sets of variables deemed necessary for the making of predictions about aggressive behavior in children. The variables represent a translation of the frustration-aggression model. The constructs, aggressive response disposition and inhibition, are translated into cartoon media for use with boys, ages 6 through 12 years. The data indicate a significant age difference operating in the kinds of response to frustration chosen. There is a consistent and significant increment to the prediction of concurrent aggressive behavior

when combinations of response dispositions and inhibitory variables are used instead of using aggressive response variables alone. Using both types of variables also results in an appreciable drop in the amount of false positive error as compared to using aggressive response variables alone.

References

1. Berkowitz, L. The expression and reduction of hostility. *Psychol. Bull.*, 1958, 55, 257-283.
2. Brown, J. S., & Farber, I. E. Emotion conceptualized as intervening variables with suggestions toward a theory of frustration. *Psychol. Bull.*, 1951, 48, 465-496.
3. Chasdi, Eleanor H., & Lawrence, Margaret S. Some antecedents of aggression and effects of frustration in doll play. In D. C. McClelland (Ed.), *Studies in motivation.* New York: Appleton-Century-Crofts, 1955.
4. Cohen, H. Social norms, arbitrariness of frustration and status of the agent of frustration in the frustration-aggression hypothesis. *J. abnorm. soc. Psychol.*, 1955, 51, 222-226.
5. Dollard, J. L., Doob, W. L., Miller, N. E., Mowrer, O. H., & Sears, R. R. *Frustration and aggression.* New Haven: Yale Univer. Press, 1939.
6. Farber, I. E. Anxiety as a drive state. In *Nebraska symposium on motivation.* Lincoln: Univer. of Nebraska Press, 1954. Pp. 1-45.
7. Fisher, R. A. *Statistical methods for research workers.* (8th Ed.) London: Oliver & Boyd, 1941.
8. Guilford, J. P. *Psychometric methods.* New York: McGraw-Hill, 1936.
9. Heymann, G. M. Some relationships among hostility, fantasy aggression and aggressive behavior. *Amer. Psychologist,* 1956, 11, 391. (Abstract)
10. Holland, J. A personality inventory employing occupational titles. *J. appl. Psychol.*, 1958, 42, 336-342.
11. Jenkins, N. Affective processes in perception. *Psychol. Bull.*, 1957, 54, 100-127.
12. Kagan, J. The measurement of overt aggression from fantasy. *J. abnorm. soc. Psychol.*, 1956, 52, 390-393.
13. Miller, N. E. The frustration aggression hypothesis. *Psychol. Rev.*, 1941, 48, 337-342.
14. Murray, H. A. *Thematic Apperception Test manual.* Cambridge: Harvard Univer. Press, 1943.

15. Pastore, N. The role of arbitrariness in the frustration-aggression hypothesis. *J. abnorm. soc. Psychol.*, 1952, 47, 728-731.

16. Patterson, G. R. The assessment of drive and inhibition in children. Paper read at Amer. Psychol. Ass., New York, Sept., 1957.

17. Peters, C. C., & Van Voorhis, W. R. *Statistical procedures and their mathematical bases.* New York: McGraw-Hill, 1940.

18. Pittluck, Patricia. The relation between aggressive fantasy and overt behavior. Unpublished doctoral dissertation, Yale Univer., 1950.

19. Purcell, K. The TAT and anti-social behavior. *J. consult. Psychol.*, 1956, 20, 449-456.

20. Sanford, R. N., Adkins, M. M., Miller, R. B., Cobb, E. A., & others. Physique, personality and scholarship: a cooperative study of school children. *Monogr. Soc. Res. Child Develpm.*, 1943, 8, No. 1.

21. Sears, R. R. Relation of fantasy aggression to interpersonal aggression. *Child Develpm.*, 1950, 21, 3-6.

22. Sears, R. R., Whiting, H. W., Nowlis, V., & Sears, Pauline. Some child rearing antecedents of aggression, and dependency in young children. *J. genet. Psychol.*, 1953, 47, 135-234.

23. Smith, J., & Coleman, J. The relationship between manifestations of hostility on projective tests and overt behavior. *J. proj. Tech.*, 1956, 20, 335-344.

24. Stone, H. The relationship of hostile aggressive behavior to aggressive content of the Rorschach and Thematic Apperception Test. Unpublished doctoral dissertation, Univer. of California at Los Angeles, 1953.

A MULTIDIMENSIONAL STUDY OF MATHEMATICALLY GIFTED ADOLESCENTS

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Superior children have long captured man's imagination. Much of the early research in developmental psychology concerned itself with an attempt to understand the idea of giftedness. Beginning with the work of Binet, Terman, and Hollingsworth (4), there have been many excellent longitudinal and cross-sectional studies which have attempted to describe high intelligence as it relates to other variables. Miles's (8) monumental summary of the literature represents a bibliography of 418 references. However, with very few exceptions, studies of giftedness begin with a sample of children with high IQ, rather than with high achievement.

There would, therefore, seem to be a great need to investigate as broadly as possible those children with high achievement who also test high in intelligence, for it would seem that out of this group of students would come those with the highest productive potential—the future intellectuals. It is essential that we take a careful look at future scientists if we are to better understand the characteristics which combine into scientific genius. One of the abilities which seems common to all science is mathematics. Therefore, if one were trying to pick an area of achievement that would have the highest predictive value for future productivity in all areas of science, mathematics would present a logical choice. Thus, it would be extremely worthwhile to study intensively the characteristics of mathematically superior children.

Such a possibility presented itself at Florida State University in the summer of 1959, when for the second year the Education Department of FSU, under the sponsorship of the National Science Foundation, conducted a six-week summer program in advanced mathematics for high school

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students. This program, developed by Nichols (9) and his staff, was designed as a pedagogical experiment in the teaching of higher mathematics to a highly select group of ninth, tenth, and eleventh grade students.

These students were adolescents selected on a national basis for proficiency in mathematics. The Sequential Test of Educational Progress (STEP), Mathematics Test, 1B was the primary discriminating agent. In addition to the STEP test score, teacher recommendations, school grades, mathematical sophistication, and certain personal evaluations were used in the selection of the math camp student body. From the 5,000 applications for the six-week program in advanced mathematics at the NSF-FSU Summer Math Camp for the year 1959, 40 were selected.

These 40 students were divided into two groups of 20 students each, with those adolescents having completed at least three years of College-Prep math making up group II. There were three tenth graders and 17 eleventh graders in this group. Students in group I were (except for two eighth graders) ninth graders and had completed at least their first year of algebra. Thus, the major consideration for selection was a demonstrated achievement and mathematical aptitude, rather than IQ scores.

The purpose of this study, then, was to describe, compare, and contrast this highly select sample of adolescents chosen primarily on the basis of unusual ability in the field of mathematics. Variables explored were intelligence, social class, family relations, personality, religious attitudes, and values.

Method

Subjects

The subjects were the entire student body of the 1959 NSF-FSU Summer Math Camp. Two groups of 20 subjects each were used to add precision by reducing the variability due to differences in age and in mathematical proficiency. The mean age for group I was 14.6, for group II, 16.6 years. There were 32 boys and eight girls in the student body. Three of the girls were in group I, five in group II.

The high proportion of boys to girls in this student body is in agreement with the findings of Terman and Bird (12), although it is somewhat higher than they would predict. However, it is noted by Witty (16) that with a very large sample the sex difference does not appear. In the present investigation, the very large difference may stem from the fact that this was a summer camp of some six weeks duration with fewer girls able to come. Or it may be that mathematics still remains primarily a masculine field. In any event, of the students who were given bids to come to camp, only three refused, due to previous acceptance of an earlier announced program.

The screening tests were taken by 4,829 applicants. For the 20 available positions in group I there were applications from 1,395 boys and 1,135

girls. For group II there were applications from 1,619 boys, but only 680 applications from girls. This seems to show a marked decrease in mathematical interest by girls between the ages of 14 and 16.

Measuring Instruments

All subjects were administered either the Wechsler Intelligence Scale for Children (WISC) (14) or the Wechsler Adult Intelligence Scale (WAIS) (15). Because of the age differences group I was administered the WISC and group II, the WAIS. Five of the 15-year-olds were administered both instruments as a reliability check, the reliability score being within the standard error of the test.

The McGuire-White Index of Social Status, Short Form (7) was given to approximate the socioeconomic status. Satisfaction with family relationships was studied by means of both the Family Relations Scale of the California Test of Personality (13) and the Kell-Hoeflin Incomplete Sentence Blank (3). Evaluation of personality variables was effected by means of the Minnesota Multiphasic Personality Inventory (MMPI) (2). Religious attitudes were explored by the method of Kuhlen and Arnold (5), and values were investigated through the use of Study of Values, developed by Allport, Vernon, and Lindzey (1).

At the end of the six-week laboratory the STEP Mathematics Test, Form 1A was administered to the students.

Results

Intelligence

The method of selecting the subjects from the available adolescent population left little doubt that these would be superior children as far as intelligence was concerned, although their selection was not based to any degree on intelligence per se. We were prepared, then, for these adolescents to be bright, to display a high IQ, but we did not expect them to be so uniformly bright as was the case. Intelligence, for the purpose of the study, is defined in terms of Wechsler IQs as determined from the WISC or WAIS, scales which contain two major subdivisions, verbal and performance.

The mean verbal IQ scores for the older and younger groups were practically the same: group I, 139.6; group II, 139.1; total math camp student body, 139.4. The mean performance IQ scores were only four points apart, a difference which is less than the standard error terms employed: group I, 132.6; group II, 128.6; total student body, 130.6. The mean full scale IQ scores for the two groups were also within four points of each other: group I, 139.8; group II, 136.6; total student body, 138.2. The IQ scores ranged in magnitude from 133 to 152. The mean IQ scores for the total student body place these adolescents in Wechsler's Very Superior intelligence classification over-all and in the Superior range for performance.

The large discrepancy between verbal and performance abilities was the most striking finding with regard to intelligence. This was true for both groups and consistently favored the verbal items. A matched *t* test was employed to evaluate the discrepancy, which was found to be significant at the .01 level of confidence. While differences in this direction are anticipated with bright subjects, the magnitude of the obtained difference was unexpected.

In Table 1 the scaled subtest mean scores of the intelligence tests are presented. Using the norms given by Wechsler, where the mean was 10 and the standard deviation was 3, the math group had a mean scaled score of 15.2, with the younger group having a slightly higher score. These data were submitted to the Cochran's *Q* test of significance of difference as presented by Siegel (10). The variability of the group was low, SD of 1.8, as compared to Wechsler's finding of 3.0. The over-all difference between verbal and performance scores for the combined group was significant beyond the .01 level of confidence. Table 1 shows that almost without exception the verbal scores are above the math campers' mean and the per-

TABLE 1

SCALED WECHSLER SUBTEST MEAN SCORES AND STANDARD DEVIATIONS

	Group I		Group II		Total Group	
Subtest	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Above the Test Mean of the Math Camp Population						
Verbal						
Information	17.3	2.4	. . .	. .	16.0	2.0
Comprehension	16.1	2.0	17.4	2.4	16.8	2.2
Arithmetic	15.2	1.7	16.0	2.0	15.6	1.9
Similarities	18.8	2.9	15.7	1.9	17.2	2.4
Vocabulary	16.0	2.0	16.3	2.1	16.2	2.0
Performance						
Coding Symbols	15.6	1.9	. . .	. .	15.2	1.7
Below the Test Mean of the Math Camp Population						
Verbal						
Information	. . .	. .	14.8	1.6	. . .	. .
Digit Span	14.1	1.4	14.0	1.3	14.0	1.4
Performance						
Coding Symbols	. . .	. .	14.8	1.6	. . .	. .
Picture Completion	14.3	1.4	13.6	1.2	14.0	1.3
Block Design	14.9	1.6	15.1	1.7	15.0	1.7
Picture Arrangement	14.8	1.6	14.9	1.6	14.8	1.6
Object Assembly	13.6	1.2	12.3	.8	13.0	1.0
Total Test	15.5	1.8	15.0	1.7	15.2	1.8

formance scores are below their mean. The only total group performance subscale that reaches the general mean was Coding, while the only total group verbal subscale below the general mean was Digit Span.

The greatest difference between the various subtests occurs between the performance tests (Picture Completion and Object Assembly) and the strictly verbal tests (Comprehension and Similarities). It is the authors' feeling that it is this great difference between abstract and concrete thought which at least in part acounts for the great lack of agreement between preschool tests of children and later measures of their abilities. The preschool tests are much more a measure of the concrete performance abilities, whereas later performance is weighted in favor of abstract verbal tasks. This points out the need for a more reliable measure of early verbal ability such as one might get on a concept formation test.

The one verbal scale subtest which was below the general mean was Digit Span. The significance of this test is still little understood. It is clearly a measure of auditory attention span and seems to be readily affected by anxiety. It was the opinion of the entire staff that these students displayed an unusual amount of tension during the testing. We felt that these students were fiercely competitive and that they tended to take the intelligence test extremely seriously. The examiners reported that the digit span errors were made in terms of transpositions and were done very rapidly, though the student could demonstrate a higher level of ability when the test was experimentally extended beyond the two misses allowed for scoring purposes.

The correlation between the full scale IQ and the STEP Mathematics Test 1A was low (.18) and positive. The range on the STEP test was from the 99th to the 58th percentile rank, with only one student scoring below the 91st percentile rank. The SD, based on the raw scores, was 5.2, and the range was from 23 to 49, with only one score being below 31. The very narrow range of scores on both the intelligence test and the STEP test makes this low correlation quite understandable, especially when one takes into consideration that the population is drawn from the upper limits of both tests.

Social Class

Information for the McGuire-White Social Class Index, Short Form was obtained from the incomplete sentence material. Because of some resistance regarding family income, adequate data were not obtained from five of the subjects and were subsequently omitted from the classification.

According to Table 2, which shows the social class division of the math camp student body, this was obviously a middle class group. It was a middle class group in spite of the fact that it was free and competitive. Eighty per cent of the student body came from the middle class. Only one subject came from the lower class, and that from the upper lower class. The majority of the upper class children were from professional families—physi-

cians, architects, and engineers. This classification system by McGuire and White places a higher premium on education and income than does the conventional system of Warner. It is obvious that at the high school level, with a sample of 40 from 5,000 adolescents, highly selected on the basis of achievement, one fails to get a normal distribution of social class.

TABLE 2

SOCIAL CLASS DIVISION IN NUMBER AND PER CENT

Social Class	*Number*	*Per Cent*
Upper	6	17
Upper Middle	18	51
Lower Middle	10	29
Upper Lower	1	3
Total	35	100

Family Relations

The Family Relations Subtest of the California Test of Personality was administered to both groups, a test believed to predict the degree of satisfaction with family relations. The mean of the combined group fell at the 61st percentile rank, using norms based on the age range of the second group, since no norms were available for the first group. Group I, the younger group, obtained a mean percentile score of 71; group II, 52. The significance of the difference between the two groups was evaluated by means of the Mann-Whitney test (10), since the assumption of normality could not be made. The difference was significant beyond the 5 per cent level.

Although these findings could be interpreted to mean that the older group has poorer family relations, it seems more tenable to assume that they reflect the striving for independence which is more typical of older adolescents. It may be, then, that this measured difference is merely a product of normal development.

Further investigations of youth-parent relations were attempted utilizing the Kell-Hoeflin Incomplete Sentence Blank. The test norms were based upon a population of 359 Ohio State freshmen. These norms were used as they would seem likely to relate to our older group's age, though of course they are not truly suitable for the younger group. In any event the comparison seems to be a valid one, since there is no significant difference between the two groups in mean scores.

The authors suggest that the scores below 350 are descriptive of a positive, satisfying, developmental atmosphere. Scores ranging between 350 and 400 are descriptive of neutral or mixed feelings, and scores over 400 describe negative, unsatisfying, and autocratic feelings.

The mean scores of the two math camp groups for the Kell-Hoeflin Incomplete Sentence Blank were almost identical: group I, 394 with standard deviation of 47.4; group II, 395 with standard deviation of 41.3. There is a fairly high degree of variability with the greater variability being seen in group I.

There is obviously no significant difference between the means for the two groups. Because of the apparent difference in the variability between groups, the *F* test for homogeneity of variance was applied. This resulted in an *F* value of 1.32, which is not even significant at the .10 level. Thus, the groups are homogeneous, at least with respect to performance on the sentence completion test.

Omitting three test blanks which were not scorable, the range extended from a low of 278 to a high of 480. In general, however, it may be seen that these youngsters as a group display pronounced neutral or mixed feelings and are very close to the negative, unsatisfying, and autocratic orientation with its undesirable connotations.

Personality

The Minnesota Multiphasic Personality Inventory was administered to all subjects, and 13 of the available subscales were scored for the study. The scores are standard scores based upon a mean of 50 and a standard deviation of 10.

In Table 3 it can be seen that the subscale deviation scores are quite small, but it is to be remembered that these are mean scores and not individual deviations, which tends to make any deviation more significant. The general practice in the interpretation of the test is to consider a score

TABLE 3

MEAN SCORES OF MMPI SCALES

Scale	*Males I*	*Males II*	*Females I & II*
L	63	60	59
F	53	53	47
K	55	57	60
HS	52	53	47
D	58	61	42
Hy	58	55	50
PD	55	57	51
Mf	61	67	47
Pa	56	56	53
Pt	60	54	55
Sc	57	57	54
Ma	50	55	50
Si	51	49	51

which deviates as much as six standard score points from the mean as being significant.

All subjects obtained a relatively high score on the L scale. This suggests that the total group tends to choose responses which place them in the most accepted light socially. Of the other validity scales, only the K scale tended to be high. Here the highest score of all was attained by the girls. It would appear that, although all subjects wished to give a good impression of themselves, this was even more important for the girls. This concern over created impression and a general sophistication about tests was a typical feature of the test responses of the students, in general, and the girls, in particular. On these scales they differ greatly from Hathaway's high school group (2).

The males in group I were a standard deviation high on the Mf and Pt scales. Because of the preference of these students for intellectual, scholastic, and sedentary activities, it is not at all surprising that they were not apt to score in the normal range on Masculinity on a test such as the MMPI. These students were interested in reading and chess for recreation and, in general, had very little to do with sports. It is the usual conclusion that this subscale does not measure masculine identification as such. In fact, Hathaway considers it a good predictor of scholastic success. The Pt scale may reflect a certain tension state which was present during the session. It was obvious to all concerned that the students stayed at a high level of tension throughout the period they were under observation.

The older males were high on the Pt scale and were even higher on the Mf scale, indicating they were even less like their peers in activity preference than were the younger children.

Religious Attitudes

A religious attitude scale described by Kuhlen was administered to all subjects and the data compared with the normative data presented by the author. This scale consisted of two questionnaires or check lists, the first studying admitted religious problems and the last dealing with acceptance or rejection of religious statements.

Data relating to church attendance and membership were also obtained and are recorded in Table 4. Both groups were predominantly Protestant and were characterized by regular church attendance. Seventy-four per cent of group I attended church every week.

From Kuhlen's norms, it has been determined that the subjects in this study have discarded beliefs at a much earlier age. Even the younger group display relatively few concrete beliefs. These gifted children were more tolerant than corresponding age groups in Kuhlen's study, although group differences are not as pronounced. Seventy-nine per cent and 84 per cent, respectively, believe Catholics, Jews, and Protestants are equally good. Contrary to Kuhlen's findings, the gifted subjects did not show an increasing dislike of church service with increasing age.

TABLE 4

CHURCH AFFILIATION AND FREQUENCY OF ATTENDANCE

		Frequency of Attendance			
Affiliation	*Members*	*Weekly*	*Monthly*	*Yearly*	*Rarely*
Group I					
Baptist	3	3	.	.	.
Church of God	1	1	.	.	.
Episcopal	1	.	.	1	.
Jewish	3	1	2	.	.
Lutheran	3	3	.	.	.
Methodist	3	3	.	.	.
Presbyterian	1	1	.	.	.
Unitarian	2	2	.	.	.
None	2	.	1	.	1
Total	19	14	3	1	1
Per Cent	100%	74%	16%	5%	5%
Group II					
Baptist	1	1	.	.	.
Congregational	2	2	.	.	.
Friends	2	.	1	.	1
Jewish	2	.	1	1	.
Latter Day Saints	1	.	.	1	.
Lutheran	1	1	.	.	.
Methodist	4	4	.	.	.
Presbyterian	3	2	1	.	.
Roman Catholic	1	1	.	.	.
Unitarian	1	1	.	.	.
None	2	.	.	.	2
Total	20	12	3	2	3
Per Cent	100%	60%	15%	10%	15%

In general, these gifted children tend toward more abstract beliefs, clearly representing a more mature group than did the Kuhlen study. They attend church regularly and are concerned about a number of religious problems. In this context the tendency toward abstractness should not be confused with liberality. This math camp student body tended in many ways to be more orthodox than one might expect from such a sophisticated group.

Values

The Allport-Vernon-Lindzey Study of Values was given to all subjects. The corrected value judgments are displayed in Table 5. Separate scaling on the following six categories was obtained: theoretical, economic, religious,

political, aesthetic, and social. The group mean rating for each value is presented in descending order. The scores are corrected scores according to the method employed by Lindzey, and high or low scores exceed the range of 50 per cent of all scores for that value. Scores were considered outstandingly high or low if they fell beyond two probable errors.

TABLE 5

CORRECTED VALUE JUDGMENT SCORES RANKED IN DESCENDING ORDER

Value	*Score*	*Evaluation*
Theoretical	49.8	High
Economic	41.3	Median
Religious	39.5	Median
Political	38.7	Median
Aesthetic	36.4	Median
Social	34.2	Low

The math camp students scored high on theoretical values, low on social values, and in the median group on each of the other values. The theoretical man is described in Spranger's *Types of Men* (11) as one whose dominant interest is the discovery of truth. "In the pursuit of this goal he characteristically takes a cognitive attitude, one that looks for identities and differences, one that divests itself of judgments regarding the beauty or utility of objects, and seeks only to observe and to reason. Since the interests of the theoretical man are empirical, critical, and rational, he is necessarily an intellectualist, frequently a scientist or philosopher. His chief aim in life is to order and systematize his knowledge" (p. 109).

Obviously this characterization of types is rather flattering and neglects the baser qualities, but it does in many ways capture the ideal of these students, which they expressed in their everyday work at the math camp. The lack of demonstrated social value is not particularly surprising in a group selected on a basis of facility in dealing with, and an interest in, mathematics. It must also be noted that, because of the nature of the test, a high score on one value necessarily causes a low score on another.

General Observations

A rather interesting aspect of the behavior of these students during the summer was not measured directly by our instruments, but was observed by the entire staff. This was an almost fierce independence with regard to how they spent their out-of-class time. Study, of course, took up a great deal of time, as did long and abstract "bull sessions"; but, more than that, they invested a great deal of time in chess and bridge, frequently staying up all night. Though they played some individual sports and some musical instruments, they completely resisted any regimented activity in the way

of planned recreation. In fact, irregularity would seem to have been the rule, with a high drive level continually displayed and an occasional spurt of frenzied mental activity.

Another favorite pastime engaged in by a great number of the math campers, particularly the younger ones, was what we came to call "baiting." That is, there had been some publicity, particularly around the university, of the fact that these 13- and 14-year-olds were being taught calculus, Russian, interplanetary ballistics, and the programming of the IBM 650. And it was not unusual for these youngsters in public places to allow themselves to be overheard while discussing the most abstruse and complex topics to the utter consternation of the local people and the amusement of fellow math campers.

Conclusions

This highly select group of mathematically gifted adolescents, selected for exceptional achievement, demonstrated, as expected, extremely high scores on intelligence. They also demonstrated a significant difference between their verbal and performance abilities as measured by the Wechsler Intelligence Scale, with their verbal ability being consistently high. This predominantly middle class group appeared to be somewhat anxious, highly competitive, and concerned about the impressions they were creating. As a group they seemed to be maturing much more rapidly in terms of family and social relationships than their high school peers. They had a marked tendency toward abstract beliefs and theoretical values; regular church attendance and concern about ethical problems was a predominant feature of their self-concept. They were much more orthodox and conventional in their approach to religious matters than one might expect from such an early maturing adolescent group. In general, the math camp student body was found to be uniformly well adjusted, showing little signs of egocentricity or one-sidedness.

References

1. Allport, G. W., Vernon, P. E., & Lindzey, G. *Study of values.* (Rev. Ed.) Boston: Houghton Mifflin, 1951.
2. Hathaway, S. R., & McKinley, J. C. *Minnesota Multiphasic Personality Inventory manual.* New York: Psychological Corp., 1951.
3. Hoeflin, Ruth, & Kell, Leone. The Kell-Hoeflin incomplete sentence blank: youth-parent relations. *Monogr. Soc. Res. Child Develpm.*, 1959, 24, No. 3 (Serial No. 72).
4. Hollingsworth, Leta S. *Children above 180 IQ: origin and development.* New York: World Book, 1942.

5. KUHLEN, R. G., & ARNOLD, M. Age differences in religious beliefs and problems during adolescence. *J. genet. Psychol.*, 1944, 65, 291-300.

6. MCGEHEE, W., & LEWIS, W. D. The socio-economic status of the homes of mentally superior and retarded children and the occupational rank of their parents. *J. genet. Psychol.*, 1942, 60, 375-384.

7. MCGUIRE, C., & WHITE, G. D. *The measurement of social status.* Austin: Univer. of Texas Press, 1955.

8. MILES, CATHERINE C. Gifted children. In L. Carmichael (Ed.), *Manual of child psychology.* New York: Wiley, 1946. Pp. 886-953.

9. NICHOLS, E. D. The Florida State University 1958 summer mathematics camp for talented high school students. *Bull nat. Ass. sec. Sch. Principals,* 1959.

10. SIEGEL, S. *Non-parametric statistics for the behavioral sciences.* New York: McGraw-Hill, 1956.

11. SPRANGER, E. *Types of men.* (Trans. from 5th German edition of *Lebensformen* by P. J. W. Pigors.) Halle: Niemeyer, 1928.

12. TERMAN, L. M., *et al.* Mental and physical traits of a thousand gifted children. *Genet studies of genius.* Vol. I. Stanford, Calif., Stanford Univer. Press, 1925.

13. TREGS, E., CLARK, W., & THORPE, L. *Manual of directions, California Test of Personality—Adult Series.* Los Angeles, Calif.: Test Bureau, 1942.

14. WECHSLER, D. *Wechsler Intelligence Scale for Children.* New York: Psychological Corp., 1949.

15. WECHSLER, D. *Manual for the Wechsler Adult Intelligence Scale.* New York: Psychological Corp., 1955.

16. WITTY, P. A. Relative frequency of gifted boys and girls in the secondary schools. *Educ. Admin. & Supervis.*, 1934, 20, 606-612.

THE RELATIONSHIP BETWEEN EXPECTATIONS AND FRUSTRATION IN CHILDREN[1]

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The present study was concerned with Amsel's theory of frustrative nonreward (1) as it might apply to children. The major implication tested is that the relationship between symbolic (verbal) expectative responses and frustration is similar to the postulated relationship between more peripheral expectative responses (i.e., fractional anticipatory goal responses) and frustration. According to Amsel, the latter relationship is positive, and hence the present prediction was that the former relationship is also positive; i.e., the stronger the symbolic expectative responses of reward, the greater the amount of frustration when that reward is removed.

Expectative responses have been both stimulus-defined (2) and response-defined (4). Following the procedures of Amsel (2), the former alternative was chosen for the present study. In essence, the stimulus definition of an expectative response consists of a probability statement: the greater the number of pairings of a stimulus with reward, the greater the probability that the stimulus will elicit (expectative) responses originally elicited by the reward itself. If this stimulus is different from the cues eliciting the instrumental response, then expectative responses can be manipulated independently of the instrumental response.

Amsel suggests several indexes of frustration. One is resistance to extinction of an instrumental response. According to Amsel, nonreinforcement

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of a previously rewarded instrumental response results in a primary, aversive motivational condition termed frustration. Further, the amount of such frustration is a positive function of the strength of fractional anticipatory goal responses. Thus, in more general terms, the stronger are expectations of reward, the greater is the amount of frustration resulting from nonreinforcement. Since frustration is conceptualized as an aversive motivational condition, it should, according to Amsel, elicit avoidant response tendencies which would interfere with the instrumental response. Thus, it follows that the greater the strength of expectative responses, the faster should experimental extinction occur, holding other factors constant.

A second index of frustration is intensification of ongoing responses at the time of frustration. This assumption is based on Hull's formula of a multiplicative relationship between motivation and habit strength as determinants of response strength. The greater the amount of frustration, the greater the amount of motivation, and hence the stronger ongoing responses should be, holding other factors constant. In the present study, resistance to extinction of an instrumental response was quantitatively measured, and data relevant to response intensification were gathered incidentally. In addition, verbal responses made during training and extinction were recorded.

Method

Subjects

Thirty-two second grade children from the Manhattan Beach Public Schools served as *Ss*.[2] The data of three additional *Ss* were discarded, two in order to equate sex ratio and one due to procedural difficulties. The nature of the results is not affected by exclusion of these data.

Apparatus

The apparatus consisted of two main units, a response box and a control box. The response box measured 12 in. high, 12 in. wide, and 22 in. long, and was painted gray. Mounted on the top was a lever which served as the response element. Directly behind the lever and protruding from the top of the box was a 120-v., 30-w., clear light bulb. Protruding from the front of the box was the end of a chrome-plated tube which served as a marble dispenser. A clear plastic tube which served as a marble receptacle was fastened to the end of the tube. The response box was placed on a low table so that its top was below *S*'s eye level.

The control box, along with *E*, was situated behind a curtain on the other side of the table, out of *S*'s line of vision. For the purposes of the present study, two Standard Electric Clocks, a rubber tube, and two control buttons were the relevant components. The clocks were circuited in

[2] Thanks are due to Superintendent Lester Beggs of the Manhattan Beach Public Schools for providing subjects for this experiment.

such a way that pushing a control button resulted in the activation of one clock. When the response lever was depressed by *S* with sufficient pressure (approximately 2 to 3 pounds), the circuit to this clock was broken while a circuit to the second clock was completed. Thus, cumulative times of responding and no-responding could be measured.

A rubber tube was mounted so that it fed into the response box and connected with the hidden end of the tube serving as a marble dispenser. If *E* dropped a marble into the end of the rubber tube, it fell into the marble receptacle approximately 1 second later.

A second control button served as *E*'s manual control of the light on top of the response box.

Procedure

The subject was led into the experimental room and told that the game consisted of trying to get enough marbles to win a prize. He was told to hold the response lever down continuously until the receptacle was filled. The experimenter then went behind the curtain and told *S* to begin.

The *Ss* were randomly divided into two groups with the restriction that the sex ratio remain constant. Thus, there were nine boys and seven girls in each group. Both groups received six marbles with the same varied temporal interval between marbles: 10, 30, 50, 30, 50, and 10 seconds, in that order. For group P, the light was paired with marble ejection. It was activated approximately 5 seconds before marble ejection and terminated as the marble struck the receptacle. For group U, the light was unpaired with marble ejection. It was activated six times during training, but such activation was randomly determined with the following restrictions: (a) each activation occurred at some multiple of 10 seconds; (b) such activations were always separated from marble ejection by at least 10 seconds. A separate, different schedule was prepared for each *S* in group U.

Extinction began with ejection of the sixth marble. The light was activated every 30 seconds for all *Ss*, but no marbles were ejected. Cumulative response time was recorded when cumulative no-response time reached 5 and 10 seconds. If 10 seconds of no responding had not been reached by 15 minutes of extinction, a marble was ejected and the experimental session terminated.

Results

Resistance to Extinction

Of the 16 *Ss* in group U, 13 did not reach the 10-second no-response extinction criterion in 15 minutes of extinction. Only four *Ss* in group P did not reach this extinction criterion in 15 minutes of extinction. This difference was evaluated by dichotomizing each group into those who reached the criterion and those who did not. The resulting subgroup scores are indicated at the beginning of this paragraph. Chi square, cor-

rected for noncontinuity, equalled 8.03 ($df = 1$, $p < .01$). Chi square values of approximately the same value were obtained using three other indexes of resistance to extinction: *Ss* who reached a 15-minute time limit with a cumulative no-response time of less than 5 seconds, and those who reached a 10-minute time limit with cumulative no-response times of less than 5 and 10 seconds, respectively.[3]

Response Intensity and Verbalizations

Certain cues served to indicate very roughly the amount of pressure *S* was exerting on the response lever during training and extinction. These cues, for the most part, consisted of vibration or movement of the response box on top of the table. Such cues were present for practically all group P *Ss* during extinction and were observed for only one group U *S* (this *S* pushed the lever with such intensity that the response box slid to the edge of the table and fell on the floor, terminating the experimental session at 13 minutes of exinction time).

Verbal responses made by *S* once the experiment started were recorded. The purpose was to observe if such data indicated a differential awareness of the relationship between the signal light and marble ejection for groups U and P. During training only one *S* indicated such an awareness. This *S* was a member of group P. During extinction seven *Ss* indicated such an awareness. All were from group P.

Discussion

The results of this study suggest that Amsel's postulated relationship between fractional anticipatory goal responses and frustration may also apply to human *Ss* and more symbolic expectative responses. That is, in the present study, expectative responses were manipulated independently of the instrumental response by pairing or nonpairing of the signal light with marble ejection. It was assumed that pairing the light with marble ejection would result in the conditioning of verbal "marble" expectative responses to the light. Spontaneous verbalizations supported this assumption. It was also found that pairing the light with marble ejection resulted in less resistance to extinction, as well as in evidence suggestive of greater response intensity during extinction. As these response measures are assumed to reflect degree of frustration, the inference of a relationship between verbal expectative responses and frustration follows.

Other studies with children have reported an increase in response strength with the onset of extinction (3, 5). So far as the author is aware, however, none has demonstrated a relationship between operations defining

[3] In two preliminary studies, no significant differences were found between groups U and P. Two procedural changes appear responsible for the present results. In the preliminary studies, (a) the signal light was activated only 2 seconds prior to marble ejection, and (b) only about ¼ pound pressure was required to depress the response lever.

expectative responses and resistance to extinction nor a relationship between operations defining expectative responses and response intensification at the time of nonreward. Haner and Brown (3), however, found response intensification to be positively related to "nearness to goal" at time of nonreward. If it is assumed that expectative responses increase in strength as *S* approaches a goal, then these data would confirm part of the results of the present study.

Summary

Two groups of children were instructed to hold a lever down continuously in order to obtain marbles which could be traded for a prize. For group P a light was paired with marble ejection, while for group U the light was unpaired with marble ejection. During extinction the light was activated equally often in both groups. It was found that group P extinguished faster and exerted more pressure on the response lever during extinction. These results were interpreted in terms of frustration theory.

References

1. Amsel, A. The role of frustrative nonreward in noncontinuous reward situations. *Psychol. Bull.*, 1958, 55, 102-119.
2. Amsel, A., & Hancock, W. Motivational properties of frustration: III. Relation of frustration effect to antedating goal factors. *J. exp. Psychol.*, 1957, 53, 126-131.
3. Haner, C., & Brown, P. Clarification of the instigation to action concept in the frustration-aggression hypothesis. *J. abnorm. soc. Psychol.*, 1955, 51, 204-206.
4. Lewis, D., & Duncan, C. Expectation and resistance to extinction of a lever-pulling response as functions of percentage of reinforcement and amount of reward. *J. exp. Psychol.*, 1957, 54, 115-120.
5. Screven, C. The effects of interference on response strength. *J. comp. physiol. Psychol.*, 1954, 47, 140-144.

EFFECTS OF AGE DIFFERENCES ON CHOICE BEHAVIOR [1]

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In probability learning research one finding resulting in a great deal of interest is that some *Ss* in a multiple-choice situation on a partial reinforcement schedule tend to respond to each of the alternatives with a probability of response equal to that of the actual probability of occurrence of reward for each alternative. It is evident that by responding with a probability of unity to the most often reinforced alternative, termed "pure strategy" by von Neumann and Morgenstern (6), the subject can make the maximum frequency of correct predictions, whereas if he responds according to the probability of occurrence of reinforcement for each alternative, his reward is necessarily limited. Estes accounts for this seemingly contradictory behavior by stating that:

> The behavior pattern exhibited by these (latter) *Ss* . . . would be advantageous if the environmental probabilities were to change at any point in the series so that the formerly unfavorable response became the more favorable. . . . A rational subject operating under 'pure strategy' . . . would not have discovered that the balance of probabilities had been changed. . . . Probably long experience with environmental uncertainties has developed relatively stable habits of response to reinforcement and non-reinforcement (4, p. 136).

The above formulation and the one by Tolman and Brunswik (8) suggest that the extent of previous experience with reinforcement probabilities is one of the crucial variables determining choice of alternatives involving probability rather than certainty of reward.

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[1] This paper was delivered at the 1957 meeting of the American Psychological Association.

[2] The first author collected the data as part of an M.A. thesis accepted by the Graduate School of the University of North Carolina under the direction of the second author who is now at the Ohio State University.

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In this study the experiential variable is manipulated by varying between group age differences. One experimental group is composed of nursery school pupils (group N) who have had necessarily limited experience with probabilities. The other consists of elementary school children (group E) whose reinforcement histories should include significantly wider contact with environmental uncertainties. The experimental procedure was designed to test the following hypotheses which appear to follow from the above-mentioned formulations and the implications of previous research in this area (1, 2, 3).

1. Group N will have a higher mean response to the more frequently reinforced alternative than will group E and will tend to approach an asymptote of unity to the higher reinforced alternative.

2. For group E the ratio of response to each alternative will approach an asymptote corresponding to the actual probabilities of reinforcement experimentally assigned to each alternative.

3. Under conditions of reversal of the actual probabilities of reinforcement of the two alternatives, the elementary school children will recognize this situation more quickly and make the shift in response more efficiently than will the nursery school group.

Method

Subjects

The *Ss* in group N were 40 nursery school pupils (20 of each sex) aged 4 to 6 years. Group E (20 boys and 20 girls aged 9 to 11) were fourth and fifth grade pupils in a public school. The *Ss* were fairly homogeneous in regard to socioeconomic and intellectual background.

Apparatus

A token delivery mechanism was devised in which the schedule of delivery could be controlled by the experimenter. Poker chips were stacked in a tube inside a box upon which was painted a clown's face. When either the right or left lever, buttons on the clown's collar, was pushed, a solenoid was activated, which by means of a pulley assembly moved a plate, allowing a chip to fall and be delivered through the clown's mouth. On nonreinforced trials the current was cut off by means of a concealed switch operated by the experimenter.

Groups and Conditions

Half the *Ss* in each age group were given 100 massed acquisition trials on a 70-30 reinforcement schedule. The other half received the same treatment on a 90-10 program.

Twenty of the *Ss* (10 in each age group) on the 70-30 schedule and 20 on the 90-10 series upon completion of their 100 acquisition trials were immediately presented with 100 reversal training trials on an 80-20 sched-

ue where the 80 per cent reinforcement appeared on the side opposite from the more frequently reinforced alternative of the previous 100 trials. All groups were counterbalanced for sex and for position of greater reward (R or L side); otherwise, the *Ss* were randomly assigned to the group.

Procedure

Each *S* was told that by pushing the buttons on the clown's collar one at a time (this was demonstrated by the experimenter) he could obtain poker chips which could be redeemed at the rate of a penny (group E) or a piece of candy (group N) for every five chips.

The two sides were differentially reinforced according to a predetermined schedule. The reinforcements were randomly distributed throughout the trials with the reservation that the first response to each side was to be reinforced regardless of when it appeared in the series of trials. In addition, the reinforcement schedules for each side were made to converge every 10 trials; e.g., for a 70-30 schedule, 7 of every 10 trials on the left and 3 of every 10 on the right were reinforced. Convergence of reinforcement patterns every 10 trials is presumably not discriminable to *Ss* (7).

Results

Acquisition Data

Figure 1 shows the mean frequency of response to the higher reinforced alternative during acquisition plotted against successive blocks of 20 trials. The 70-30 schedule appears on the left and the 90-10 schedule on the right. Apparently, differential learning is taking place. Group N *Ss* appear to be learning to respond to the alternative which will give the most reinforcement while elementary school *Ss* are evidently learning to respond to the probabilities of occurrence of each reinforcement.

To evaluate the effects of age alone and age interacting with other variables, a Type III, "mixed" design, analysis of variance (5) was computed. As may be seen in Table 1, age contributed significantly to the frequency of response to the maximally reinforced alternative. The t tests on the significant F for age show that on both the 70-30 schedule ($t = 4.24$, $p < .002$) and the 90-10 series ($t = 2.17$, $p < .05$) group N chose the maximally reinforced alternative significantly more frequently than did group E.

The t tests on the significant ratio variable reveal differences in responding to the two ratios for each age group; $t = 4.93$ for group N and $t = 7.00$ for group E, both significant beyond .001. The effect of trials was also significant, as is expected in any learning function. None of the interactions were effective.

Chi square distributions were constructed to determine the number of *Ss* in each age group who were responding to the maximally reinforced side by using "pure strategy" (100 per cent response) or by approximating the

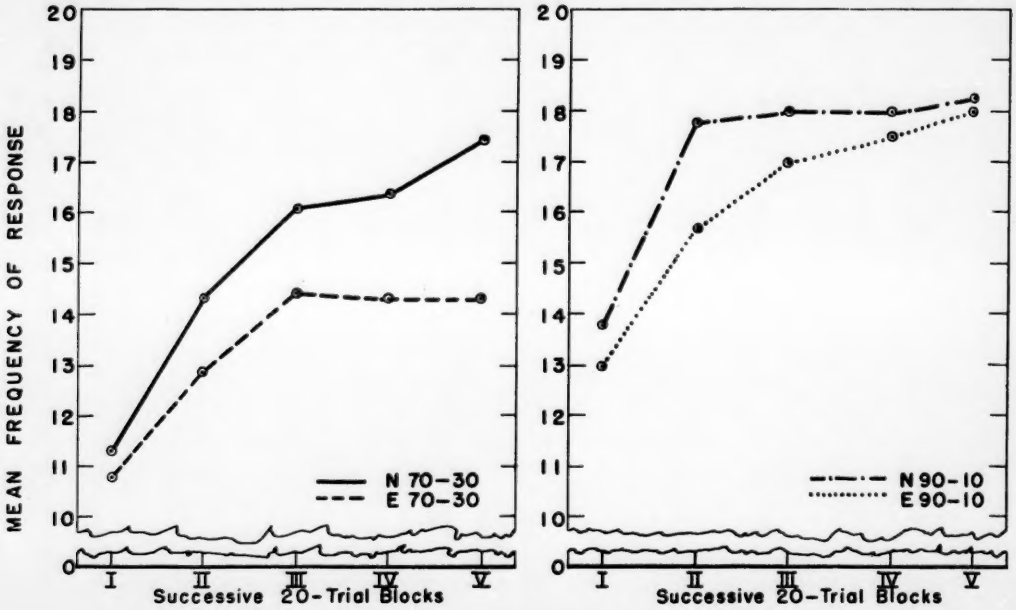

FIGURE 1—Mean frequency of response to the maximally reinforced alternative during acquisition.

TABLE 1

ANALYSIS OF VARIANCE OF RESPONSES TO THE MAXIMALLY REINFORCED ALTERNATIVE DURING ACQUISITION

Source of Variation	*df*	*Mean Square*	*F*	*p*
Between *Ss*	79	52.28		
Age (A)	1	180.90	4.12	.05
Reinforcement ratios (R)	1	627.50	14.27	.001
A × R	1	18.92	0.43	
Error (between)	76	43.96		
Within subjects	320	9.42		
Trials (T)	4	300.52	52.26	.001
T × A	4	4.14	0.72	
T × R	4	2.63	0.46	
T × A × R	4	9.16	1.59	
Error (within)	304	5.75		
Total	399			

actual probabilities (70 per cent or 90 per cent). Data from only the last 10 trials were used in order to utilize the most stabilized performance. For the 70-30 ratio, 9 or 10 responses to the maximally reinforced side were considered "pure strategy"; for approximation of actual probabilities 6 to 8 responses were designated the cutoff points. On the 90-10 ratio, 10 responses were classified as "pure strategy" and 8 or 9 responses approximated actual probabilities. Seven of the 80 *Ss* (fairly evenly distributed among the four groups) were not included in this analysis because they did not use either mode of response.

On the 70-30 schedule 13 of the group N *Ss* used "pure strategy" as compared to only 5 of the *Ss* in group E. On the other hand, 14 of the *Ss* in group E approximated actual probability as compared to only 4 of the group N *Ss* ($\chi^2 = 7.13$, 1 *df*, $p < .01$). On the 90-10 schedule, 14 of the group N *Ss* used "pure strategy," whereas 4 approximated actual probabilities. But, in the case of the group E *Ss*, 10 approximated actual probabilities and 9 used "pure strategy" ($\chi^2 = 2.46$, 1 *df*, $p < .10$).

Reversal Data

The reversal training curves shown in Figure 2 denote the mean frequency of response to the 80 per cent reinforced alternative which in each case was on the opposite side to the one more frequently reinforced during the acquisition training. As is evident from the graph, group E made a much more rapid reversal after both previous reinforcement series than did group N. By the last 20 trials, however, group N had accomplished the reversal and was responding at the level of group E.

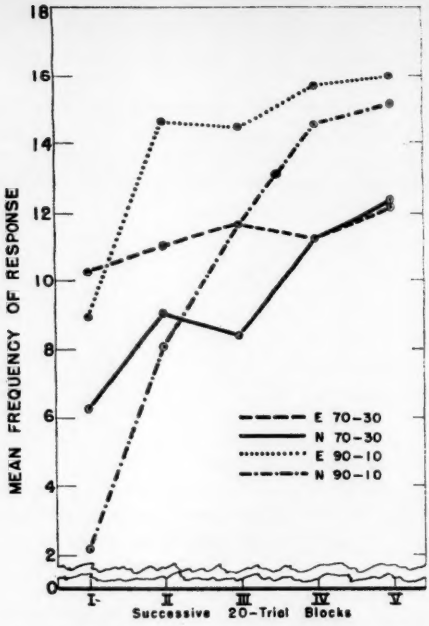

FIGURE 2—Mean frequency of response to the maximally reinforced alternative during reversal.

TABLE 2

ANALYSIS OF VARIANCE OF RESPONSES TO THE MAXIMALLY REINFORCED ALTERNATIVE DURING REVERSAL

Source of Variation	*df*	*Mean Square*	*F*	*p*
Between *Ss*	39	132.26		
Age (A)	1	369.92	2.89	.10
Reinforcement ratio (R)	1	158.42	1.24	
A × R	1	40.50	0.32	
Error (between)	36	127.90		
Within subjects	160	21.67		
Trials (T)	4	299.98	24.82	.001
T × A	4	49.90	4.13	.005
T × R	4	71.85	5.94	.001
T × A × R	4	10.00	0.83	
Error (within)	144	12.09		
Total	199			

Table 2 presents the summary of the analysis of variance performed on the reversal data. The t tests of the Trials $\times$ Age interaction (combining both ratios) shows that group E responded with a higher frequency than did group N on the first three blocks of trials. The t tests for the interaction Trials $\times$ Ratios (both age groups combined) indicate that, although *Ss* who had been on a 70-30 schedule reversed faster in the first 20 trials, there was a transition during the second block of trials and that the 90-10 *Ss*, thereafter, responded to the maximally reinforced side with a higher frequency than the 70-30 *Ss*.

Discussion

The significance of the age variable in combination with the lack of any interaction effects points to longitudinal differences in experience with reinforcement probabilities as being a crucial variable in itself in determining mode of response to partially reinforcing situations. The chi square analysis lends further confirmation to the major hypotheses by indicating that most nursery *Ss* on either schedule tend to respond to the higher reinforced alternative with a probability of response approaching unity, whereas, in the main, elementary *Ss* respond to the 70-30 ratio with a probability of response approximating the actual probability of reinforcement for each alternative. However, individual elementary *Ss* on a 90-10 schedule respond equally with a probability of .9 or 1.0. This may be due to the proximity of these two values.

We would expect to find no difference in the manner of response to the two reinforcement schedules for group N since they should not be responding to the actual probabilities of the presentations of reinforcements. The increasing similarity of response to each ratio in the final trials suggests that, once the discrimination as to which side is more highly rewarding is made, then nursery *Ss* on both ratios will tend repeatedly to choose that side. The significant t between reinforcement schedules appears to result from the fact that the maximally reinforced alternative is more easily discriminated in the 90-10 than in the 70-30 series.

Estes' (4) notion concerning the adaptive function of probability learning is given confirmation in that group N on both series took 80 trials after reversal to reach a level of appropriate responding equal to that of group E. The lack of difference between the age groups on the final 20 trials is probably due to group N *Ss*' overtaking those in group E in their attempt to approximate 100 per cent response to the maximally reinforced alternative. Further study involving more reversal trials will be necessary to determine whether either group had reached an asymptote.

Ss operating on the 70-30 condition probably reversed faster than the 90-10 *Ss* because they had previously been reinforced more often on the side of the lesser alternative; furthermore, there was more competition of response for the 90-10 group. When the reversal was recognized, however,

groups reversing from the 90-10 series reached a higher response frequency, presumably because there is a more discriminable difference between the 90-10 and 20-80 schedules than between the 70-30 and 20-80 conditions.

In view of the manner in which these results have confirmed the original hypotheses, it seems reasonable to conclude that previous experience with reinforcement probabilities should be taken into account in interpreting ways of responding to partially reinforced choice situations.

Summary

This experiment was designed to investigate the function of previous experience with probabilities in determining the mode of responding to differentially reinforced alternatives. Following formulations of Estes (4) and of Tolman and Brunswik (8), it was predicted that nursery school children (less experienced with probabilities) in a two-choice situation would use "pure strategy," their probability of response to the maximally reinforced alternative asymptoting at unity. On the other hand, it was predicted that elementary school children (more experienced with probabilities) would respond with a probability value equal to the actual occurrence of reinforcement. In general, positive evidence was found for these predictions.

References

1. Attneave, F. Psychological probability as a function of experienced frequency. *J. exp. Psychol.*, 1953, 46, 81-86.
2. Bendig, A. W. The effect of reinforcement on the alternation of guesses. *J. exp. Psychol.*, 1951, 41, 105-107.
3. Bush, R. R., & Wilson, T. R. Two-choice behavior of paradise fish. *J. exp. Psychol.*, 1956, 51, 315-322.
4. Estes, W. K. Individual behavior in uncertain situations: an interpretation in terms of statistical association theory. In R. M. Thrall, C. H. Coombs, & R. L. Davis (Eds.), *Decision processes*. New York: Wiley, 1954. Pp. 127-137.
5. Lindquist, E. F. *Design and analysis of experiments in psychology and education*. Boston. Houghton Mifflin, 1953.
6. von Neumann, J., & Morgenstern, O. *Theory of games and economic behavior*. Princeton: Princeton Univer. Press, 1947.
7. Ross, B. M. Probability predictions between and within series. *J. Psychol.*, 1954, 37, 279-289.
8. Tolman, E. C., & Brunswik, E. The organism and the causal texture of the environment. *Psychol. Rev.*, 1935, 42, 43-77.

NURTURANCE IN PRESCHOOL CHILDREN AND ITS RELATION TO DEPENDENCY

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Of the many types of social behavior that characterize preschool-aged children, one frequently overlooked in research is *nurturance*. Yet learning to nurture other people (altruism in act, if not altruism in motive) is a significant social accomplishment for children in western cultures. Development of such behaviors is basic to success in some of an individual's most important roles, e.g., those of friend, spouse, parent, teacher, etc.

The present study of nurturant behavior in young children is exploratory in nature and has these goals: (a) development of an observational technique for the measurement of nurturance in preschool children; (b) examination of age and sex differences in frequency of occurrence of such behaviors; and (c) exploration of certain behavioral correlates of nurturance, particularly the various forms of dependence. In this study nurturance was globally defined as the child's giving affection, attention (including help), reassurance, and protection to other persons present in a nursery school group.

Murphy's early study of sympathy (5) was concerned with one component of nurturance as defined here (reassurance). Murphy found that sympathy occurred with slightly greater frequency in older than in younger preschool children and with approximately equal frequency for boys and girls. Walters, Pearce, and Dahms (7) employed an observational method to study the incidence of affectionate behavior in preschool groups, a type of response that is one other component of nurturance as defined in the present investigation. Affection, in the observations of Walters *et al.*, occurred more frequently among three-year-old boys than among two-year-old boys, but age differences for boys at the older preschool levels were not significant. No age differences were found for girls. Although sex differ-

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ences in total amount of observed affection were not tested for significance, the data published indicate a lack of significance. Gewirtz (3) defined nurturant behavior in a manner similar to the present investigation and employed frequency measures based on observations of children in nursery school. No significant age or sex differences were found.

Although not entirely consistent, the evidence in general suggests that sex and CA may not be relevant to the incidence of nurturance in the behavior of preschool children. However, there is some evidence to suggest that this may not be the case for adults. Edwards (1) found college women to be significantly more nurturant than college men on the nurturance measure included in his Personal Preference Schedule.

Of most concern to the present investigators was the question of whether nurturance is systematically related to other forms of social behavior during the preschool years. Children's behavior appears to occur in certain broad patterns. Discovery of such patterns should facilitate study of both the antecedents of behavior and the ensuing development of personality. Hence, examination of some of the possible correlates of nurturance was included as part of this investigation. Measures of dependency were chosen for this purpose.

In a sense, nurturance stands opposed to dependence: dependency involves the seeking of nurturance *from* others, nurturance the proffering of support *to* others. However, affection, affiliation, assistance, and reassurance are all involved in both types of behavior. It is possible that nurturance and dependency may be incompatible behaviors such that measures of each would be negatively related. On the other hand, nurturance may be a socially desirable, mature response directed toward the same goals as dependency, i.e., affection, support, approval, etc. Thus, a positive relation may exist between measures of the two types of behavior. Still a third possibility is that nurturance and dependence represent independent categories within the totality of human social behavior.

Included in Murray's listing of manifest needs (6) are *n* Succorance (suppliant, helpless dependence), *n* Affiliation (affectionate, good-natured sociability), and *n* Nurturance (compassion, protectiveness and indulgence). *n* Succorance and *n* Affiliation together describe dependence as this latter term is conventionally used in the social development literature. The description of *n* Nurturance corresponds to a considerable degree with the global definition of nurturance used in the present paper. Murray indicates that on occasion *n* Nurturance may be fused with, or subsidiary to *n* Affiliation. On the other hand, *n* Nurturance and *n* Succorance are described as complements of one another: "*n* Succorance is the tendency to cry, plead, or ask for nourishment, love, protection or aid; whereas the *n* Nurturance is the tendency to satisfy such needs in a succorant O. . . . The Succorance drive seeks a nurturant O and the Nurturant drive seeks a succorant O" (6, p. 181). *n* Nurturance and *n* Succorance are thus complementary only in the interaction of two individuals. Apparently they are not so related

within the personality organization of a single individual, except that Murray indicates *n* Succorance is sometimes to be found in conflict with *n* Nurturance.

The above discussion of three of the manifest needs in Murray's system implies the following: (a) nurturance and affiliation should be positively related to some degree; (b) the relation between nurturance and succorance should be negative, if not zero.

Recently, Edwards (1) has supplied empirical evidence concerning these relations. From data on 1509 adult subjects of both sexes used in the standardization of the Personal Preference Schedule, intercorrelations among the measures of mainfest needs were computed. The measures of nurturance and affiliation were correlated +.46; the measures of nurturance and succorance +.16. Although both these correlations are positive and significant, they confirm the hypotheses described above, in that the former is moderate in magnitude while the latter is close to zero.

In the present study an observational measure of nurturance was secured for two groups of preschool children. Simultaneously, observational measures of six types of dependency behavior were obtained by Updegraff and Mann (4). It was expected that these measures of preschool children's behavior would augment Edwards' findings concerning the relation between nurturance and dependency.

Method

Subjects

The subjects for this investigation were 41 children attending three sessions at the Preschool Laboratories of the Iowa Child Welfare Research Station. These subjects were divided into two groups according to chronological age. The younger group consisted of 10 boys and 11 girls, who ranged in age from 3-2 through 4-2, with a mean age of 3-8. The older group contained 9 boys and 11 girls, ranging between 4-6 and 5-7, with a mean age of 5-2. Children in the preschools between the ages of 4-2 and 4-6 were used for observer training. The children attending these Preschool Laboratories represent a rather homogeneous population with respect to socioeconomic status (upper-middle) and intelligence (above average).

Procedures

Fifty-five three-minute observations on each child in the sample were carried out during 18 school days in a period of four weeks in late spring when the children spent most of their time in large outdoor play areas. Subjects were observed in rotation with order of observation random (as determined by shuffling the stack of name cards) and changing after each child had been observed once.

Each three-minute observation consisted of three phases: (a) a 30-second period during which the observer became familiar with the situation in

which the child was involved; (b) a two-minute period for observing all instances of nurturance and dependence; and (c) a 30-second period for observation of the consequences of any nurturance or dependence that had occurred. Thus, the time-sampling procedure actually yielded 55 *two*-minute observations, or a total of 110 minutes, for each child.

The observers completed a frequency count of all behaviors relevant to the subcategories listed below which occurred during the middle two-minute phase of the observation. Actual recording was done during the second and third phases of the observational period. In addition to the frequency count, the observers also recorded the object toward which the child's behavior was directed (i.e., children or adults) and the time when each observation was made. Each observer tallied instances of both dependency and nurturance. Opportunities for contamination in these data are believed to be minimal, however, since each observer was conducting a study involving only one of the two kinds of measure.

Nurturance categories and subcategories

- Giving affection
  - Offering physical affection
  - Offering verbal affection
- Giving positive attention
  - Offering praise
  - Offering instrumental help
  - Offering guidance and suggestions
  - Informs others of a third person's need
- Giving reassurance
  - Offering sympathy, comfort, consolation
  - Offering permission
- Giving protection
  - Verbally defending another
  - Physically defending another
  - Giving warning

Dependency categories and subcategories

- Seeking physical contact
- Being near another person
- Seeking reassurance
  - Seeking comfort, consolation or sympathy
  - Seeking protection
  - Seeking permission
  - Seeking verbal affection
- Seeking positive attention
  - Seeking praise and approval
  - Seeking friendly companionship and attention
  - General attention-seeking
- Seeking help
  - Seeking instructions and guidance
  - Seeking assistance in making decisions
  - General help-seeking
- Seeking negative attention

Formal descriptions of each of these categories were prepared for the observers. Each description included both general criteria for scoring and examples of behavior scorable within the category.[1]

Reliability

The two observers first completed a series of training observations on a group of children who were not subjects for the investigation. These observers then worked independently with the children in the sample, alternating days and preschool groups. On one day per week, however, both observers worked in the same group to provide a frequent check on observer reliability.

Two hundred fifty simultaneous observations were made on 10 children during the training period; 40 occurrences of nurturance and 95 occurrences of dependence were recorded in these observations. In addition, 120 simultaneous observations were made during the four weekly reliability checks on the children in the sample. Twenty-one instances of nurturance and 31 instances of dependence were recorded during these observations.

Percentage agreement was obtained by dividing the number of agreements between the two observers by the number of agreements plus the number of disagreements. An agreement was counted whenever both observers recorded a given occurrence of behavior under the same subcategory heading. Zero entries by both observers were not counted as agreements. An omission (a tally made by one observer, but not the other) was considered a single disagreement. Observer agreement for nurturance was 90 per cent for preliminary observations and 90 per cent for the four days of sample observations. Corresponding percentages for dependence were 90 and 89 per cent.

In order to estimate the stability of the total scores, the frequencies from all odd-numbered observations were correlated with frequencies from all even-numbered observations. The odd-even correlations were +.67 for nurturance and +.69 for dependency.

Results and Discussion

Summary data concerning frequencies for the four major components of nurturance may be found in Table 1. This table shows that *giving positive attention* occurred more frequently than the three other kinds of nurturance and that, in general, nurturant behavior does not appear very frequently in the social interactions of nursery school children. For purposes of analysis, frequencies in these four components were summed. It should be remembered that this total nurturance score is thus heavily weighted with *giving positive attention.*

The total nurturance score, like many frequency measures, proved to be skewed and not amenable to successful transformation. For this reason all

[1] Complete details covering this procedure may be obtained from the authors.

TABLE 1

RANGES, MEANS, AND STANDARD DEVIATIONS FOR FREQUENCIES OF FOUR COMPONENTS OF NURTURANCE IN 110 MINUTES OF OBSERVATION ($N = 41$)

	Range	*Mean*	*SD*
Giving affection	0 – 4	.42	.79
Giving reassurance	0 – 5	.95	1.14
Giving positive attention	1 – 22	6.90	4.80
Giving protection	0 – 7	1.05	1.46

analyses to be reported were made by means of chi square. In each of these analyses subjects were divided into high- and low-nurturance groups by a median split. In all cases the resulting chi squares involved one degree of freedom necessitating the use of Yates' correction throughout.

Included in Table 2 are data concerning the total nurturance score for the various age and sex groups. Since the distributions of scores for these groups are not normal, the measures of central tendency presented in Table 2 are not entirely appropriate. They show, however, the trends associated with age and sex that exist in the data. It should be stressed that the chi squares involving age and sex proved to be nonsignificant. Therefore, these data confirm the findings of several studies cited previously (3, 5, 7). Apparently, demands and pressures for nurturance-training (if they exist at all in the preschool years) do not result in differentiation of girls from boys or five-year-olds from three-year-olds. If differentiation of the sexes ultimately occurs, as suggested by Edwards' findings (1), it would appear to result from social learnings during later childhood or adolescence rather than during the preschool years.

TABLE 2

AGE AND SEX DIFFERENCES IN TOTAL FREQUENCY OF NURTURANCE IN 110 MINUTES OF OBSERVATION

	N	*Range*	*Mean*	*SD*
Girls	22	1 – 32	11.09	7.50
Boys	19	2 – 16	7.26	3.98
Younger *Ss*	21	1 – 32	8.38	7.28
Older *Ss*	20	2 – 18	10.30	5.15
All *Ss*	41	1 – 32	9.32	6.41

Separate chi squares were computed between the total nurturance score and each of the six major components of dependency.[2] These are presented in Table 3. High- and low-dependence groups in these analyses were determined by median splits except in the case of *negative attention* for which a zero-above-zero split was used.

TABLE 3

CONTINGENCY TABLES AND CHI SQUARES FOR GROUPS DIFFERENTIATED ON TOTAL NURTURANCE SCORE AND SIX COMPONENTS OF DEPENDENCY ($N = 41$)

Dependency Measure	*Total Nurturance* High	Low	χ^2	*Significance Level*
Seeks physical affection:				
High	14	7		
Low	7	13	2.94	$.10 > p > .05$
Being near:				
High	6	15		
Low	15	5	7.08	$p < .01$
Seeks reassurance:				
High	11	10		
Low	10	10	< 1.00	*ns*
Seeks positive attention:				
High	12	8		
Low	9	12	< 1.00	*ns*
Seeks help:				
High	15	6		
Low	6	14	5.48	$.02 > p > .01$
Seeks negative attention:				
High	8	6		
Low	13	14	< 1.00	*ns*

Table 3 shows that there was a significant positive association between frequencies of total nurturance and frequencies of *seeking help*. A similar association, of borderline significance, was found between total nurturance and *seeking physical affection*. However, a highly significant negative association was found between frequencies of total nurturance and *being near*.

Both *seeking help* and *seeking physical affection* represent direct, active attempts by the child to manipulate other people. These components of dependence are similar to components that had high loadings on the factor interpreted as "active attempts to gain or to maintain the adult's attention"

[2] Information concerning the dependency measures may be found in Mann (4).

in the factor analysis of attention-seeking behaviors reported by Gewirtz (2). Nurturance also is an "active" social response. Such behavior almost always involves outgoing, participative social interaction. Thus, nurturance, seeking help, and seeking physical affection appear to share a quality of "activeness" or "outgoingness."

This interpretation of the findings of the present investigation is strengthened by the significant negative association found between nurturance and *being near*. Such behavior is probably the most passive, indirect means that a child can use for securing dependency satisfactions. It is often nonverbal and involves simply following, sitting or standing close to another. This type of dependence is similar to a second factor isolated by Gewirtz which was described as: "a response pattern for attention or approval employed by the passive, docile child, or by the child in conflict over employing the more direct response pattern" (2, p. 35). The relationships found in this study suggest that if nurturance were to be included in a factor analysis such as that completed by Gewirtz it would probably: (a) load positively on the active, direct attention-seeking factor and (b) load negatively on the passive, docile attention-seeking factor.

The relationship of the present findings to Murray's need system (6) is not entirely clear-cut. It was suggested in the introduction to this paper that affiliative dependence should be positively related to nurturance while succorant dependence should be negatively related, or not at all, to nurturance. *Seeking physical affection* would seem to be one possible expression of *n* Affiliation. The borderline association it has with nurturance is therefore consistent with the expectations mentioned above. *Being near* is probably one expression of *n* Succorance, as defined by Murray, and its negative association with nurturance in the present study is also congruent with the above expectations. *Seeking help,* however, is clearly a manifestation of *n* Succorance and its positive relation with nurturance in the present data is inconsistent with the hypotheses stated above.

Only speculations can be offered concerning the antecedents of the relationships found in the present investigation. One such speculation is that the child's basic activity level acts as a major determinant of both the types of dependency he will evidence and the frequency with which he is nurturant. Perhaps some parents in the United States middle class tend to reinforce both active, outgoing types of dependency and the outgoing sociability of nurturance. Correspondingly, the data suggest the possibility that other parents may reinforce passive dependence while nonreinforcing both direct dependency and the child's efforts to nurture others. Reference to individual differences in activity level should probably be made in future studies of the relation between nurturance and dependency.

It could also be that there is some commonality in underlying motivation for both nurturance and the direct, active forms of dependence. The suggestion that altruistic behavior is based on egocentric motives must, however, be corroborated by future research.

Summary

The purposes of this study were: (a) to develop an observational technique for the measurement of nurturant behavior in nursery school children; (b) to examine age and sex differences in frequency of occurrence of such behaviors; and (c) to explore relationships existing between measures of nurturance and measures of six components of dependency.

Two groups of nursery school children were the subjects for this investigation. One group consisted of 10 boys and 11 girls with a mean age of 3-8; the other consisted of 9 boys and 11 girls with a mean age of 5-2. One hundred ten minutes of observation spread over 18 school days were completed for each child. Frequency measures of both nurturance and dependence were derived from these observations.

Nurturant behavior tends to occur relatively infrequently in the social behavior of young children with *giving positive attention* occurring most often. No age or sex differences were found. This is consistent with the findings of several other studies of preschool children's social behavior. The total frequency of nurturant behavior proved to be positively associated with the dependency components of *seeking help* and *seeking physical affection* and negatively associated with *being near*. The discussion of these findings emphasized possible commonalities in both the various types of behavior and their antecedents.

References

1. Edwards, A. L. *Personal Preference Schedule.* New York: Psychological Corp., 1954.
2. Gewirtz, J. L. A factor analysis of some attention-seeking behaviors of young children. *Child Develpm.*, 1956, 27, 17-36.
3. Gewirtz, J. L. Succorance in young children. Unpublished doctoral dissertation, State Univer. of Iowa, 1948.
4. Mann, Nancy. Children's dependency behavior and maternal attitudes. Unpublished master's thesis, State Univer. of Iowa, 1959.
5. Murphy, L. B. *Social behavior and child personality: an exploratory study of some roots of sympathy.* New York: Columbia Univer. Press, 1937.
6. Murray, H. A. (& collaborators). *Explorations in personality.* New York: Oxford, 1938.
7. Walters, J., Pearce, Doris, & Dahms, Lucille. Affectional and aggressive behavior of preschool children. *Child Develpm.*, 1957, 28, 15-26.

PERSONALITY ASSESSMENT FROM FREE PLAY OBSERVATIONS [1]

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Observation of behavior in "natural" situations has been one of the most enduring methods for studying behavior of preschool children. However, certain methodological problems have tended to reduce the value of this approach. It is the purpose of this paper to specify criteria for maximal utility of observational measures and to demonstrate the use of these criteria in the development of an observation measure for personality assessment of preschool children.

A review points up the important considerations in the development of an observational measure, as well as providing a capsule history of the emergence of psychology as a science. As emphasis on the need for objectivity and quantification increased, the early diary type of observation method (3, 16) was rejected as naive, unsystematic, biased, and nonquantified and was largely replaced by time sampling or category recording (1, 2, 7, 11, 14). While the latter emphasis led to systematization, objectivity, and quantification, it in turn has been criticized for several reasons: "(1) it provides no checks on recording individual instances of behavior, (2) it is inflexible and omits descriptive detail thus divorcing acts from their context and perhaps violating their meaning, (3) it permits fewer opportunities for the later working of the data than do diary-type, anecdotal notes" (6, p. 182), and (4) ". . . concern with reliability led to progressive modifications of the categories . . . until inter-rater agreement was at a

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maximum. . . . (but) as a result the categories . . . became more and more removed from any theoretical basis and their predictive efficiency was minimal" (8, p. 371).

Because of the limitations of the older methods of category recording, there has been a shift in emphasis in recent research. Two trends are apparent. First, an attempt has been made to develop a method which would combine the advantages of the early diary methods (flexibility and potential for qualitative analyses) with the advantages of category recording (systematization, objectivity, and quantification). This trend has been reflected in the increased utilization of refined diary type methods such as running records, impression records, and anecdotal records (18).

Secondly, an increasing emphasis has been placed on theoretical, inferential approaches. Thus, newer observational systems more frequently require the observer to make inferences from behavior concerning motives and feelings and more often are theoretically oriented so that considerations of underlying theory, rather than reliability *qua* reliability, are more crucial in determining what is to be observed (8).

From a consideration of the methodological problems extant in observational measures, the authors have abstracted the following criteria as focal to the development of maximally useful observational measures: (a) theoretical orientation, (b) systematization, (c) quantification, (d) reliability, (e) economy, and (f) use of minimally overlapping categories. In this research these criteria served as a guide for the development of an observational measure for personality assessment of preschool children in their usual nursery activities. A discussion of the way in which these goals were accomplished is presented in the following sections.

Procedure

Subjects

The *S*s were children, ages 2-6 to 5-0, enrolled in a cooperative preschool located on a college campus. Data were collected for a total of 34 children: first sample $N = 18$, second sample $N = 16$.

Criterion of Theoretical Orientation

The importance of the theoretical orientation lies in the fact that it provides coherence and coordination of the total research program. In this research the theoretical assumptions were as follows: (a) all behavior is motivated; (b) such motivations may be categorized, i.e., those behaviors which lead to the same or similar goals may be subsumed within one category; (c) prediction of behavior is more efficiently made using a two variable, rather than a single variable system, i.e., utilization of both a strength of motivation variable and a probability of reward variable; and (d) the situation or environmental context is fundamental to prediction. While some or all of these assumptions are held in common with many

current theories (4, 5, 10, 12, 15, 19), Rotter's social learning theory of personality (15) was most influential in this research.

The motivational categories used in this study were as follows: recognition-status (concern with skill or competence in social, intellectual, or play activity), love and affection (concern with acceptance, warmth, liking or being liked by others), dominance (concern with direction or control of others), protection-dependence (concern with having others prevent frustration, make decisions), and independence (concern with self-mediated satisfactions including reliance on oneself). Within each of these need categories, behavior was analyzed as to its need value (importance to the individual) and as to the individual's level of expectancy (subjective probability for success).

Criterion of Systematization

In an effort to overcome three potential sources of bias in the collection of observational data (time bias, observer bias, and situational bias), the following procedures were followed: For each sample two observers collected data for the first three months of school. Daily six children were observed (three by each observer) for four five-minute periods. In this way each child was observed at least once a week. The observation mean was 261 minutes for the first sample and 306 minutes for the second sample. Observations were made both indoors and outdoors and were distributed over the various nursery school periods, e.g., party time, free play, and story time. Indoor observations were made from an observation booth through a one-way vision mirror.

Criteria of Quantification

Typically there appear to be two decisions the researcher using observational methods must make. One of these concerns whether scoring shall be done concurrent with or subsequent to observations, and the second is whether the scoring will be derived from a category system, rating scale, or based on over-all impression. For this research, immediate scoring of behavior was rejected because such an approach would not permit rating of behavior by an individual who had not made the observations and thus would not allow for an uncontaminated estimate of reliability. Consequently, the decision was made to use running records. All observations were made in a shorthand system and were descriptive and inclusive, so that, insofar as possible, all behaviors and interactions of the child were recorded with no attempt to select or to attend to particular behaviors.

A scoring-by-example manual was developed for rating the observations. Such a method seemed preferable to scoring based on impression because it would provide: (a) potentially greater reliability since ratings are based on many verifiable referents, rather than on global clinical impressions, (b) a comparable basis for rating each set of child observations, and (c) operational definitions of the concepts. While a category system may offer

many of the same advantages, that approach was rejected because the only quantification it allows is frequency counts.

The scoring manual was constructed with five need sections, each of which has two subcategories, need value and expectancy. For each subcategory, behavioral descriptions are given with specific examples for each. These descriptions and examples are ordered along a seven-point scale and make it possible to assign each ratable behavior a need value and expectancy score in a need category, e.g., a behavior might be scored recognition-status, need value 6, expectancy 2.

Within the scoring system the environmental context or situation has been viewed as essential to assessing the meaning of a particular response, i.e., the score assigned a behavior is contingent upon the situation in which that behavior occurs. Consequently, situations have been classified as to reinforcement "loading" on the basis of (a) general cultural expectations for children of preschool age (e.g., we expect them to seek help with some articles of clothing, as boots, coats, etc.) and (b) cues for reinforcement provided by the initiator of the activity and/or by the structure of different nursery school periods (story time, party time, etc.). The classifications of situations and their relation to the scoring are given below.

A *maximally loaded situation* is defined as one in which the majority of overt cues are highly related to a single need. Because of the preponderance of cues that "insure" reinforcement in such situations, behavior which occurs within the structure of the situation is assumed to have no more than average value and is assigned a score of 3 or 4. For example, the situation is maximally loaded for recognition-status when the teacher asks, "Who knows the story about the three bears?" The behavior is assigned a score of 4 in recognition-status when the *S* responds, "I do."

A *medially loaded situation* is defined as one in which the overt cues might be related to more than one need, but are maximized for none. Because the cues are fewer and less highly related to any specific need, behavior occurring in such a situation is considered to have more importance and is assigned a score of 5. For example, the situation is medially loaded for love and affection when two children are in close proximity. The behavior is assigned a score of 5 in love and affection if the subject smiles and pats the child next to him.

A *minimally loaded situation* is defined as one in which there seems to be a lack of overt cues for the specific need in question. Because there are few cues for reinforcement, the behavior occurring in such a situation is assumed to have great importance to the individual and is assigned a high score. For example, the situation is minimally loaded for love and affection when other children are distant from *S*. The behavior is assigned a score of 6 or 7 if the subject walks across the playground to the other child, puts his arm around him, and pats him gently.

Finally, a low score is obtained only by rejection of a maximally loaded situation. For the subject to reject reinforcement which is "assured" sug-

gests that such reinforcement has a low value to him. For example, the situation is maximally loaded for love and affection when a child puts his arms around *S* and pats him gently. The behavior is assigned a score of 1 if *S* kicks, hits, or bites the initiator. It should be noted that in the example given, the *S* would also receive a high score for dominance, since the situation fits the designation of a minimally loaded situation for dominance, as well as being maximally loaded for love and affection.

Results

Criterion of Reliability

Interrater reliability of the manuals has been assessed by computing Pearson *r*s for mean child scores based on independent ratings of the two observers and an independent judge. In both samples the two observers rated all children on the total number of observations, whereas the independent rater scored observations of 10 randomly selected children from each sample on two-thirds of the total number of observations. In each case *r*s were computed for the subcategories, need value and expectancy, for the needs: recognition-status, love and affection, dominance, protection-dependence, and independence.

Interrater reliability between observers. Data concerning reliability between observers are reported in Table 1, columns 5 and 10. In general, it would appear that the manual provided a reliable measuring instrument for qualified observers, although the correlations for love and affection and the two independence variables are somewhat lower than is the case for the other variables. It should be noted that the reliabilities for the first sample, whose protocols were used in constructing the scoring manual, were not materially different from those of the second sample.

Interrater reliabilities for three raters. In an effort to assess the communicability of the scoring system, correlations were computed among the ratings of the two observers and an independent rater. From Table 2 it may be seen that for judges I and II (the observers) the range of correlations was from .00 to .93, the median *r* was .72, 21 correlations were significant at the .05 level or above, and 9 were nonsignificant. For judges I and III the range of *r*s was from .05 to .87, the median *r* was .49, 13 correlations were significant at the .05 level or above, and 17 were nonsignificant. The range of correlations for judges II and III was .11 to .95, the median *r* was .63, 20 correlations were significant at the .05 level or above, and 10 were nonsignificant.

When these data are compared with those obtained from two observers rating all the data on all subjects (Table 1), it can be seen that for three raters there was a wider range of correlations and the median *r*s were somewhat lower. While these findings are based on data from fewer children and on fewer data for each child, amount of data is probably the more significant variable. This conclusion seems warranted because of the

TABLE 1

CORRELATIONS FOR NEED VALUE AND EXPECTANCY RATINGS USING VARIABLE AMOUNTS OF DATA

	AMOUNT OF OBSERVATIONAL DATA									
	SAMPLE NO. 1 ($N = 18$)					SAMPLE NO. 2 ($N = 16$)				
Category	1st ⅓	2nd ⅓	3rd ⅓	⅔	*Total*	1st ⅓	2nd ⅓	3rd ⅓	⅔	*Total*
Recognition-Status										
Need value	.67**	.58*	.65**	.74**	.86**	.58*	.57*	.86**	.53*	.76**
Expectancy	.67**	.47*	.66**	.74**	.77**	.63**	.77**	.69**	.71**	.75**
Love and Affection										
Need value	.16	—.04	.78**	.08	.29	.69**	.57*	.62**	.73**	.77**
Expectancy	.75**	.80**	.81**	.91**	.90**	.67**	.58*	.90**	.77**	.78**
Dominance										
Need value	.52*	.82**	.77**	.91**	.93**	.76**	.81**	.87**	.88**	.95**
Expectancy	.49*	.60**	.78**	.71**	.79**	.87**	.62*	.30	.85**	.72**
Protection-Dependence										
Need value	.10	.48*	.75**	.60**	.70**	.75**	.41	.46	.53*	.76**
Expectancy	.41	.69**	.77**	.58*	.69**	.19	.70**	—.19	.65**	.75**
Independence										
Need value	.04	.24	.81**	.31	.69**	.61*	.75**	.65**	.79**	.83**
Expectancy	.45	.64**	.35	.60**	.62**	.53*	.72**	.21	.81**	.60*
Median r	.46	.59	.77	.65	.74	.65	.66	.64	.75	.76
Range of r	.04–.75	—.04–.82	.35–.81	.31–.91	.29–.93	.19–.87	.41–.77	—.19–.90	.53–.88	.60–.95

* $p \leq .05$. ** $p \leq .01$.

TABLE 2

CORRELATIONS AMONG RATINGS OF OBSERVERS (I AND II) AND THE INDEPENDENT RATER (III)

		PEARSON *r*			S-B PROPHECY		
		Sample 1 $N=10$	*Sample 2* $N=10$	*Comb.* $N=20$	*Sample 1* $N=10$	*Sample 2* $N=10$	*Comb.* $N=20$
I-II:							
R-S ...	NV ...	.79**	.92**	.82**	.85**	.94**	.87**
	EXP ...	.93**	.87**	.75**	.95**	.91**	.82**
L&A ..	NV ...	.10	.41	.49*	.14	.51	.59**
	EXP ...	.89**	.80**	.82**	.92**	.85**	.87**
Dom ..	NV ...	.90**	.85**	.70**	.93**	.90**	.77**
	EXP ...	.63*	.80**	.84**	.72*	.86**	.89**
P-D ...	NV ...	.68*	.71**	.63**	.76*	.79**	.72**
	EXP ...	.57	.72**	.76**	.66*	.79**	.82**
Ind ...	NV ...	.46	.00	.16	.56	.00	.23
	EXP ...	.08	.12	.19	.11	.16	.27
I-III:							
R-S ...	NV ...	.37	.68*	.56*	.46	.76*	.65**
	EXP ...	.86**	.73**	.37	.90**	.80**	.47*
L&A ..	NV ...	.14	.34	.27	.20	.44	.35
	EXP ...	.87**	.80**	.80**	.91**	.86**	.86**
Dom ..	NV ...	.66*	.72**	.57**	.74*	.80**	.66**
	EXP ...	.11	.78**	.49*	.16	.84**	.59**
P-D ...	NV ...	.57	.44	.48*	.66*	.54	.58**
	EXP ...	.31	.37	.42	.40	.46	.52*
Ind ...	NV ...	.52	.07	.05	.61	.11	.08
	EXP ...	.34	.10	.21	.44	.14	.29
II-III:							
R-S ...	NV ...	.27	.71*	.79**	.35	.79**	.85**
	EXP ...	.90**	.84**	.64**	.93**	.89**	.72**
L&A ..	NV ...	.53	.49	.61**	.63*	.59	.70**
	EXP ...	.93**	.95**	.85**	.95**	.96**	.89**
Dom ..	NV ...	.50	.83**	.58**	.60	.88**	.68**
	EXP ...	.11	.86**	.62**	.16	.90**	.71**
P-D ...	NV ...	.86**	.46	.78**	.90**	.56	.84**
	EXP ...	.69*	.34	.60**	.77**	.44	.69**
Ind ...	NV ...	.64*	.42	.29	.73*	.54	.38
	EXP ...	.37	.71*	.50*	.46	.78**	.60**

* $p \leq .05$. ** $p \leq .01$.

fact that (a) median *rs* based on ratings of two-thirds of the data for 10 children (Table 2) are comparable to median *rs* based on ratings of two-thirds of the data for samples of 18 and 16 children (Table 1, columns 4 and 9); and (b) when correlations based on ratings of two-thirds of the data for 10 children were corrected for length using the Spearman-Brown formula, they yielded median *rs* (Table 2) which are comparable to those obtained when all data are rated for all children (Table 1, columns 5 and 10).

In view of the comparability of findings for judges I and II (the observers) and judges II and III, it should be noted that there does not seem to be an observer bias. However, there is some indication of possible individual bias between raters I and III, since the number of significant correations and the median *rs* were considerably lower between these two raters.

Criterion of Economy

Although numerous studies have used 100- and 150-minute totals of observational time, the range has varied widely from less than one hour to several hours (9). While there has been general agreement that reliability is likely to increase with increased number of observational samples, with few exceptions there has been little systematic treatment of this question (13, 17). Because economy was considered to be one of the important criteria of usefulness of an observational measure, an effort was made in this study to determine the minimal amount of data necessary to obtain stable ratings. Accordingly, the data from each subject were divided into thirds, each third consisting of equal amounts of observational data from each observer and covering about one month of observational time. Thus, for the first sample reliabilities were computed for each 87-minute time period, for 174 minutes, and for the total 261 minutes. For the second sample reliabilities were computed for each 102-minute unit, for 204 minutes, and for the total 306 minutes. These findings are reported in Table 1. The fact that reliabilities were greater for each successive third for the first sample (.46, .59, and .77), but were approximately the same for successive thirds in the second sample (.65, .66, and .64), probably reflects degree of experience with the scoring manual; i.e., as the raters became increasingly familiar with the manual, greater stability of ratings occurred. Noting columns 1, 4, and 5 of Table 1, it appears that with inexperienced judges stable measures require about 175 minutes of observational time, but that more satisfactory reliability correlations occurred with about 260 minutes of observation. In contrast, noting columns 6, 9, and 10, it appears that with experienced raters relatively stable measures were obtained with 100 minutes of observation, although more satisfactory correlations were obtained with 200 minutes of observation.

These findings were obtained with a rather complex rating system. It was also possible to assess amount of data required for a category system by computing reliabilities for assignment of referents to motivational cate-

gories, without regard to the score assigned within the category. In many respects this kind of analysis corresponds more closely to that frequently reported in the literature. These data, reported in Table 3, parallel those from the rating system, although the correlations were consistently higher for the category system; for one-third, two-thirds, and total data, the median *r*s are .82, .81, and .89 for the first sample and .91, .96, and .95 for the second sample. As with the rating system, it appears that amount of experience in rating is an important variable although its effects are not as marked.

TABLE 3

CORRELATIONS FOR NEED CATEGORY RATINGS USING VARIABLE AMOUNTS OF DATA

	AMOUNT OF OBSERVATIONAL DATA					
	SAMPLE 1 ($N = 18$)			SAMPLE 2 ($N = 16$)		
	⅓	⅔	*Total*	⅓	⅔	*Total*
R-S	.95**	.92**	.95**	.97**	.97**	.96**
L&A	.78**	.76**	.86**	.81**	.89**	.90**
Dom	.93**	.95**	.95**	.93**	.97**	.95**
P-D	.82**	.81**	.89**	.72**	.72**	.80**
Ind	.74**	.73**	.87**	.91**	.96**	.96**
Median *r*	.82	.81	.89	.91	.96	.95

** $p \leq .01$.

Summarizing, it appears that the amount of data necessary for stable ratings is a function of the complexity of the scoring system and the degree of experience of the raters. With inexperienced raters, high reliability coefficients were obtained for a category system using 87 minutes of observation, but for a complex rating system similar reliabilities were obtained only with 260 minutes of observation. Comparable reliabilities for experienced raters required proportionally less time.

Criterion of Minimally Overlapping Categories

In an attempt to avoid superfluous or contaminated variables, the independence of categories was assessed in two ways. One method was measurement of the degree of relationship between each need category and every other need category, both for need value and expectancy. From these correlations, which are reported in Table 4, it can be seen that none of the interrelationships is of sufficient magnitude to warrant assigning a single need value or expectancy score for an individual. It appears that there is virtually no cross-need generality for need value; median *r* is .04 and only two of the 30 *r*s are significant at the .05 level. For expectancy, while the median *r* is

TABLE 4

INTERCORRELATIONS OF NEED VARIABLES

	NEED VALUE			EXPECTANCY		
Need Subcategories	*Sample 1* $N=18$	*Sample 2* $N=16$	*Comb.* $N=34$	*Sample 1* $N=18$	*Sample 2* $N=16$	*Comb.* $N=34$
R-S, L&A	—.26	.04	—.07	.50*	.23	.44**
R-S, Dom	.33	.13	.29	.53*	—.01	.44**
R-S, P-D	.31	.25	.28	.17	.47	.22
R-S, Ind	.25	.44	.25	—.09	.04	—.05
L&A, Dom	.06	—.17	—.02	.65**	.66**	.68**
L&A, P-D	.15	—.17	—.03	.43	.35	.45**
L&A, Ind	—.17	—.52*	—.36*	—.07	.27	—.02
Dom, P-D	.16	.17	.17	.03	.06	.05
Dom, Ind	—.03	—.01	—.03	.04	.38	.10
P-D, Ind	—.17	.04	—.08	—.10	.09	—.10

* $p \leq .05$. ** $p \leq .01$.

higher (.20) and eight of the 50 correlations are significant at or beyond the .05 level, it would appear that any cross-need generality is confined to recognition-status with love and affection, recognition-status with dominance, love and affection with dominance, and possibly love and affection with protection dependence.

The second test of independence of categories was made by correlating variables within need categories. From Table 5 it can be seen that need value and expectancy measures are positively and significantly intercorrelated, except for the love and affection variable.

Since other research has shown need value and expectancy measures to be relatively independent for adults (20), the results obtained here may

TABLE 5

CORRELATIONS BETWEEN SCORES OF NEED VALUE AND EXPECTANCY FOR EACH OF THE NEED VARIABLES

	Sample 1 $N=18$	*Sample 2* $N=16$	*Comb.* $N=34$
R-S	.38	.29	.34*
L&A	.00	—.22	—.01
Dom	.66**	.87**	.71**
P-D	.62**	.73**	.61**
Ind	.71**	.75**	.73**

* $p \leq .05$. ** $p \leq .01$.

be a function of the fact that preschool children do not differentiate between importance of a particular goal and the probability of achieving it.

Another possible reason for the lack of independence of need value and expectancy measures found here may be related to the technique of measurement. Observations of behavior in situations where there is relative freedom of response may not provide information regarding the entire range of expectancy and need values of a person. If the behavior which occurs in a given situation is a function of need value and expectancy, the behavior most likely to occur in a "free" situation would be that in which both need value and expectancy are above a minimal level. In contrast, structured situations, such as interviews or experimental situations, would be more likely to elicit information throughout the entire need value and expectancy continua.

Summary

The research reported here had as its goal the development of an observational measure for personality assessment of preschool children. Criteria for maximal utility of such a measure were specified, and the steps taken to meet these criteria were discussed. The theoretical assumptions of this research were outlined and were shown to relate to the development of a scoring-by-example manual. The scoring system was found to be adequately reliable both for the observers and for an independent rater. Analyses regarding economy demonstrated that amount of data required for stable ratings was a function of the complexity of the scoring system and the degree of experience of the raters. Data regarding the independence of measures suggested that there is little relationship among the need categories measured. However, moderate relationships between need value and expectancy variables within need categories were found, and possible reasons for their existence were discussed.

References

1. Arrington, Ruth E. Time sampling studies of social behavior; a critical review of technique and results with research suggestions. *Psychol. Bull.*, 1943, 40, 81-124.
2. Bott, Helen. *Method in social studies of young children.* Toronto: Univer. of Toronto Press, 1933.
3. Darwin, C. A biographical sketch of an infant. *Mind,* 1877, 2, 285-294.
4. Dollard, J., & Miller, N. *Personality and psychotherapy.* New York: McGraw-Hill, 1950.
5. Feather, N. T. Subjective probability and decision under uncertainty. *Psychol. Rev.*, 1959, 66, 150-164.

6. GELLERT, ELIZABETH. Systematic observation: a method of child study. *Harvard educ. Rev.*, 1955, 25, 179-195.

7. GOODENOUGH, FLORENCE. Measuring behavior traits by means of repeated short samples. *J. juv. Res.*, 1928, 12, 230-235.

8. HEYNS, R., & LIPPITT, R. Systematic observation techniques. In G. Lindzey (Ed.), *Handbook of social psychology*. Cambridge: Addison-Wesley, 1954. Pp. 370-404.

9. JERSILD, A., & MEIGS, MARGARET. Direct observations as a research method. *Rev. educ. Res.*, 1939, 9, 472-482.

10. LEWIN, K. Behavior and development as a function of the total situation. In L. Carmichael (Ed.), *Manual of child psychology*. (2nd Ed.) New York: Wiley, 1954. Pp. 918-970.

11. LOOMIS, A. M. A technique for observing the social behavior of nursery school children. *Child Develpm. Monogr.*, 1931, No. 5.

12. MOWRER, O. H., & KLUCKHOHN, C. Dynamic theory of personality. In J. McV. Hunt (Ed.), *Personality and the behavior disorders*. New York: Ronald Press, 1944. Pp. 69-135.

13. OLSON, W. C. The incidence of nervous habits in children. *J. abnorm. soc. Psychol.*, 1930-31, 25, 75-92.

14. PARTEN, MILDRED B. Social participation among preschool children. *J. abnorm. soc. Psychol.*, 1932, 27, 243-270.

15. ROTTER, J. B. *Social learning and clinical psychology*. New York: Prentice-Hall, 1954.

16. SHINN, M. W. *Biography of a baby*. Boston: Houghton Mifflin, 1900.

17. SMITH, M. Concerning the magnitude of the behavior sample for the study of behavior traits in children. *J. appl. Psychol.*, 1931, 15, 480-485.

18. STONE, L. J., & CHURCH, J. *Childhood and adolescence*. New York: Random House, 1957.

19. TOLMAN, E. C. Principles of performance. *Psychol. Rev.*, 1955, 62, 315-326.

20. TYLER, BONNIE B., TYLER, F. B., & RAFFERTY, JANET E. A systematic approach to interviewing as a method of personality assessment. *Amer. Psychologist*, 1959, 14, 374. (Abstract)

EXPERIMENTAL PROCEDURES OF CHILDREN[1]

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It has been pointed out by Bruner and his associates (2) that there are individual and situational differences in choice patterns in concept-formation problems. In the psychology of learning the classical approach has been for the experimenter to organize the sequence of alternatives presented; often, these alternatives are designed to make each choice maximally informative. Little is known about training subjects so that they will themselves adopt optimal methods of questioning and control for particular purposes. The following study is concerned with the conditions under which children use various techniques of control and patterns of choice. It is frankly exploratory and largely descriptive; the next step would be to experiment with appropriate conditions of training.

If a phenomenon has a number of causes or correlates, one way to study exploratory patterns would be to ask subjects to find all the causes. In this study, because the children were young and might interpret this task variously, it was decided to set a goal that would indirectly require a discovery of correlates. The subjects were asked to reproduce the phenomenon with-

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out being permitted to use identical conditions twice. It would be expected that they would try to maximize success by choosing conditions most similar to the model or first instance of the phenomenon. In these circumstances, impressionistic methods in which some variables are ignored lead eventually to erroneous predictions. It may be expected, then, that the subjects will turn increasingly toward analytic solutions, in which they learn to discriminate the relevant conditions and the direction of their effects. The points of interest in these observations are the sequence of choices, the control of variables, and the use of information obtained on each trial.

On the face of it, successive experimentation by subjects looks like an efficient learning method. Each time a choice and a verbal prediction are made, they are reinforced. But if the experimenter, rather than the subject, selected instances, he would try to train discriminations between variables. The usual technique of discrimination training would require the manipulation of one variable at a time.

When the subject himself selects instances, and most particularly when, as in normal experience, maximal success rather than clarity of information is sought, such highly controlled selection may not occur. The theoretically optimum method for acquiring sure information also increases the short-term risk of failure. Controlling a variable believed to be effective increases the likelihood that no contrast will be found under two conditions being explored. One takes this risk for the long-run value of the new, unambiguous information thus obtained, but it is unlikely that people would act this way in the absence of a marked discrepancy of pay-off in favor of later certainty. The use of controls, then, may be regarded as likely to occur only under specialized conditions when acquiring new and sure information is more important than immediate success.

If, in most natural circumstances, conditions are not successively controlled, how are predictions made? One possibility is that the learner, like a giant calculator, correlates over all instances and predicts according to the maximum probability of success.

Such a method would be successful if circumstances were unbiased, so that they have occurred independently in their various combinations. Since natural conditions do not usually form a factorial design, causal variables may be masked by correlated factors.

Furthermore, not all factors are equally present psychologically. While this filtering process is not well understood (1), it is known that there are limits to the sensory intake of the organism as well as to its storage and processing capacity. Therefore, the pattern of reinforcements over past choices may not alone predict choices whenever a complex array of factors is available. It will be necessary to assess attention in some fashion, the easiest method, although a conservative one, being the use of verbal reports.

We may expect that an attentional shift, leading to a change in predictions, is most likely to occur after failure. In explanations for failure, hitherto unnoticed factors may be mentioned. Changes in predictions, then,

should be most frequent after new factors have been mentioned in explanations for failures.

Explanations and predictions are verbal. One major source of interference for children in the analytic solution of physical problems arises in their lack of experience in discriminating traits verbally. Confusion of traits might arise from three sources. One is the correlation of traits in experience. For instance, big things are usually heavier and stronger. The second is confusion arising from the use of a term for a relative quality; e.g., a short rod might be called thick because it is thicker relative to its length than a long rod. A third difficulty arises when a descriptive term can refer to a number of attributes and therefore may discourage their discrimination, e.g., "heavy" (of material differences or density, thickness, total weight), "skinny" (length, thickness).

In investigations with kindergarten and first grade children, it was found that a substantial proportion of the children refused to accept verbally the independence of such traits as "big," "strong," "heavy." They would say "If something is big, it can't be weak." This suggests that the differentiation of these traits may proceed slowly, relying on instances which violate the usual correlation. The children who said that they were independent offered striking exceptions, e.g., a sick big dog who was weak (3). In view of the lack of controlled presentation of instances in actual experience, most children at first learn to apply these terms roughly to the same domain of traits. Therefore, there should be more verbal confusions in the younger children in the sample.

Method

Subjects

Twenty second and third graders were selected for this study, which was a control training for another experiment. Eight were boys and 12 were girls. They ranged in age from 8 years to 8 years, 9 months. The mean Kuhlmann-Anderson IQ was 116; the standard deviation was 9, the range being from 101 to 139.

Apparatus

The apparatus was suggested by Inhelder and Piaget's study of the separation of factors in flexibility (4). A set of rods was prepared, consisting of wood, brass, aluminum, and steel rods. Half of each type were 15 inches long, and half were 24 inches long. In turn, half of these were ⅜ inch in diameter, and half were ¼ inch in diameter. The rods had washers on one end, and the other end could be inserted in a holder consisting of a block of wood elevated on legs, with holes bored in the block for the two sizes of rods. A hinged section could be hooked down to hold the rods rigidly in place when they were inserted. The holes in which the rods are inserted were seven inches from the base. Large stoppers from standard toilet plumbing equipment were stuffed with lead wool, yielding two different weights,

which looked alike. These could be hung by strings from the washer end of the rods. There were two heavy and two light weights.

Procedure

When the child entered the experimental room, he was shown the display of rods, and the materials were discussed and the various differences, to make sure that the child could describe all the attributes. Then:

A. Now I'm going to take the long thin wooden rod and put it in here, and the short thick steel rod and put it in here and lock them in. Then I'm going to take a light weight and put it on the long thin wooden rod and the heavy weight and put it on the short thick steel rod. Let's see what happens. (Wooden rod goes down.) Why do you think that happened? (Probing to find attributes.) Now I'm going to take these off. We won't be able to use these rods again. Now I want you to pick any two rods there you see and use any two weights you want. Pick one to go down and one to stay up. Which one will stay down? Why? Which will stay up? Why? (Test) What happened? Why do you suppose that happened? (This is repeated through four pairs.)

B. 1. I've got a rod and a weight that touches bottom. Could you tell me anything about it? What else would you need to know about before you could tell for sure?

2. Suppose we had only heavy weights and long rods, which rod would you pick to touch bottom and which to stay up?

3. Suppose we had only light weights and long rods?

4. Suppose we had only light weights and short rods?

5. What kind of a wooden rod would stay up and what kind of a brass rod would touch bottom?

6. If we had a long, thin, wooden rod with a light weight on it and a short thick brass rod with a heavy weight on it, what would happen? Why?

7. If we made the wooden rod shorter and thicker and the brass rod longer and thinner, what would happen?

Results

A content analysis was made of each child's choices, predictions, explanations of failure, and responses to hypothetical questions. The data will be described and discussed below in terms of special problems: the effects of verbal habits on performance, use of the information available in the display pair, information acquisition in successive trials, controls, and shifts in the definition of the task. Finally, an over-all assessment will be offered of the relative success of the children in discriminating the effective factors in flexibility.

Labeling Effects

Six second-graders and three third-graders had some kind of confusion of attributes in their speech. Two of the children referred to length as "thickness" and throughout the experiment failed to control length. During the subsequent questioning, they talked about the effects of "thickness."

These children displayed no knowledge of the effects of length and failed to include length as a variable in verbal discussion. The children did not actually talk about "thickness" and make choices differentiating length; once having converted length information into terms of thickness, they continued to make choices referring to the actual attribute of thickness in the rods.

The most common confusion was the use of "heavy" and "light" to describe differences of material, differences in thickness, and the differences between the weights used, interchangeably. Several children believed that the principle explaining the phenomenon involved some relation between the heaviness of the rod and the heaviness of the weight. Some of the greatest difficulties in making predictions and the clearest failures to discriminate variables resulted from the use of these complex hypotheses. Such children usually identified heaviness both with the heavy materials and the thick rods, and in several cases they failed to control material because they talked about heaviness and controlled only thickness. The most extreme example of terminological overgeneralizing occurred in a third grade girl:

> *Sara* (8;1): (The steel rod stays up in the display pair.) This is heavier than the wood stick. The stick is heavy and so is that (the weight) and that holds that up. . . .
>
> 1. (A heavy weight stayed up on a thick long brass rod and a light one went down on a wood rod.) This one is falling down because it's on the light stick and this stick is holding this one up because the stick is heavy and this is heavy too. . . .
>
> 2. [Why are you picking those rods? (thick short wood, thin short wood.)] To see if the heavy one goes down and the light one stays up. [Why are you putting the heavy weight on that (thin) stick?] To see if the heavy one stays up on a light stick. [And the light weight on that (thick) stick?] To see if it falls down. [Why did this happen?] The stick is light and the heavy part is pulling the light part down. [Why does this (thick) one stay up?] The heavy part is holding the light part up.
>
> 3. (Puts heavy weight on steel, light on aluminum.) Because this is light and so is this. I put the heavy part on the heavy part. I want to see if the light one stays up and the heavy one falls down. [Why did they both stay up?] Because the heavy one is on the heavy part and the light part is on the light part.
>
> 4. [Why those weights?] I'm putting the light part on the light part, and the heavy part on the heavy part. I want to see if the heavy part stays up and the light part goes down. [Why will the light part go down?] Because the light part is on the light part? [Why did both stay up?] Because the light part is on the light part and the heavy part is on the heavy part. [What do you mean?] The heavy part is smaller and fatter and it's holding this part up. It's longer and it's holding the light part up. [I have a rod that is touching bottom. What can you tell me about the rod and the weight?] Did you put a light part in there and a heavy part on it? The light stick is holding the light part down.

This child persistently switched back and forth in her description between calling the rod or the weight the "light part" and between referring

to material differences or thickness differences. In the verbal questioning, she did not mention thickness differences as a means of varying flexibility, even when offered an instance when material was controlled. This case was the most extreme example of interference with a verbal analytical treatment of variables that arises when terminology is overgeneralized.

Effects of the Display Pair

The children entered the experimental situation having had previous experience with flexibility and weight. The first formal display was the same for all the children: the long, thin, wooden rod with a light weight went down, and the short, thick, steel rod with a heavy weight stayed up. The weights were deliberately misleading. The children were asked what happened and why. Their responses give some indication of the saliency of the materials, their vocabulary, and their previous training with respect to the flexibility. The material difference one would expect to be most evident because there were four material variants in the display and only two variants on the other dimensions. All of the children offered material as an explanation of the difference, and 12 offered the weights even though, in fact and in their earlier experience, the difference between the weights could not account for the difference in flexibility. A clue to one source of their concern with weight is given by the fact that the third graders all confined themselves to descriptions involving weight and material; they had at that time been exposed to a unit on weight in their regular classroom work. Throughout the experiment there was greater preoccupation with weight in the third graders.

To some extent these explanations were merely enumerative of differences; offering the weights as an explanation is for some children merely descriptive. When asked to explain why one rod bent more than the other, the children may have listed differences without regard to their priority in probable causation. The reduction in the number of children who actually used the contrasts they named as a cause, when the task was to choose a contrasting pair, indicates that the explanations were not based on the same grounds as the later predictions. Of the 20 offering material difference as an explanation, 12 offered material difference as a basis of prediction. Of the 12 children who mentioned the difference between the two weights, five offered the same difference in a prediction. Of four mentioning thickness, three offered it in a prediction, and of three mentioning length, only one offered it in a prediction. Thus, there were differences in the attention to different attributes from the start, judging from verbal reports.

One difference was deliberately designed to contradict previous experience. The heavy weight stayed up and the light went down. Three children who misperceived the weight difference in the display pair, and corrected themselves or were corrected by the experimenter, all proceeded to use weight contrasts in the first pair, with the light weight expected to go down. This prediction regarding weight was intimately associated with the display

pair; if a child did not predict that a light weight will go down on the first pair, he never did. The misleading evidence was disruptive to five of the children. They vacillated in their predictions regarding the role of weight or repeated unsuccessful predictions about weight.

The use of a higher order statement regarding the relations between the rod and the weight occurred with six children at some point. The statement that light weights go on light rods and heavy weights on heavy rods is a natural inference from the display pair; three third graders and one second grader made this comment. For several third graders the persistence in pursuing this relation of congruence—or alternating it with testing a contrast relation—resulted in repeated failures and inability to sort out the independent effects of the weights and the characteristics of the rods.

The Successive Use of Information

It would normally be expected that successful predictions would be followed by repetition when possible, within the limited number of trials available in this study. Out of 19 instances of successful predictions on the first three trials, 15 repeated the same hypothesis. For three of these only were additional contrasts introduced to test new predictions while retaining the earlier contrast.

It is notable, however, examining the verbal content of hypotheses offered, that something special happened after success. While 95 per cent of the verbal hypotheses offered refer to variables the child had already mentioned, there were three children who broke this pattern and with no apparent basis in previous practice made completely novel hypotheses about certain of the variables they had not mentioned before. Each of these cases occurred after a successful prediction.

In the case of failure in prediction, a child could revert to familiar contrasts which have previously succeeded in his own trials or on the model pair. In 60 per cent of the cases the children did not do this; they repeated, with minor modifications, the prediction just offered.

The intervention of a forced explanation is likely to bring the child to observe factors in the situation that differ from the model he has been using. In this design, since all the children were asked to give explanations, there was no way of contrasting those who did with those who did not. Of 50 instances of explanations offered after failures, almost half involved comments about uncontrolled variables. The rest were divided evenly. Some children mentioned new information, usually about the materials whose relative strength they had not known; some reversed their hypotheses and in effect said they had been wrong. The remaining times they compared a current condition with an earlier one—for instance, this wood rod stays up because it's thick and the other one was thin. In effect, the last behavior could indicate observation of a new variable.

Thus, there are two criteria in explanations inferring attention to variables not used in making a prediction. One is noticing uncontrolled

variables, the other is comparison with earlier trials. Almost half of these cases involved variables that had been mentioned before on earlier trials but had been subsequently left uncontrolled. A fifth had been mentioned in describing the display pair, but the rest involved the observation of variables never mentioned before. The four crucial variables were mentioned with equal frequency in explanations, in spite of the marked discrepancies in describing the display pair. Thus, thickness and length, ignored at first, came to be noticed in explanations for predictive failures.

Once an explanation was offered, was the variable used systematically? The fact that almost half of the uncontrolled variables involved familiar aspects used earlier in explanations indicates one vicissitude—the children shifted their attention. But, if we examine only the *new hypotheses* in prediction that occurred immediately following a failure, it appears that half followed noting unfamiliar variables or new contrasts with old instances. Thus, while a child might notice an uncontrolled variable and then not use it or control it, it also happened that he used these cases in setting up novel hypotheses. Also, though he might appear to forget in that he failed to control a variable he just mentioned a minute earlier, the verbal interrogatory later revealed that he had not in fact forgotten at all. These observations, even when they were not repeated, were a source of information that might be drawn on immediately in the following hypothesis or control, might be ignored immediately but used in a later prediction, or might not be referred to again until the interrogatory.

The Use of Controls

One of the most striking ways in which a child's approach to this procedure differs from a trained adult is that there is considerably less use of controls both on known and unknown factors. If the effect of a factor is known, it is damaging to let it vary in the wrong direction. If its effect is unknown, risk is minimized by holding the variable constant. If one examines the instances where there is no positive indication that the child was using a factor—that is, he used it neither in prediction or explanation—one finds that thickness was controlled only a little better than chance and length even less. In addition, we have seen that, even after a child has used a variable in an explanation, he may fail to vary it favorably or control it in a substantial proportion of cases. Over half the children made such errors, some several times.

Control could arise simply by chance—the child selected two rods and he happened to choose rods alike on a particular characteristic. Active control was rarely discussed by the children, except for a few instances of deliberate testing of hypotheses by second graders:

> *Peter* (7;11): (A wood and a steel short thin rod. Heavy weights on both.) [Why did you use heavy weights?] On the wood, because the wooden one on the first pair went down. On the steel, because I want to find out which can hold it.

(Again, two heavy weights on a short thin aluminum and long thick steel.) Because I want to see if they go down. The steel one will stay up.

Tom (7;0): (Heavy weights on a thin short steel and a thick long steel.) I want to see which one can hold it best. I think the thin one will touch bottom.

John (7;2): (Heavy weights on a long thin brass and short thin aluminum.) I'm going to find a short stick. Both are skinny, and this one is once and three-fourths longer than that one. The long one is going to go down.

Harvey (7;11): (Heavy weights on short thin aluminum and short thin steel.) I think aluminum bends easy, but I'm not sure. I'm trying to find out if the heavy weight would bend steel.

The chief competitor with the use of controls was a belief that, if a variable is effective, it should stand up in spite of the other variables at work.

Another approach was control across pairs, violating the rules of the procedure.

Jean (8;9): (Two heavy on long thin aluminum and long thin brass.) I want to see if both go down or both stay up if they have two heavy ones on them.

(Two light ones on short thin steel and short thick wood.) I want to see what will happen if both are light. They both should go down because on the two heavy ones they both go down. [Why is that?] The two heavy ones were the same and they went down so maybe the two light ones are the same and they'll go down.

The method of testing by contrast is striking.

George (8;4): (Had consistently used heavy weights on the rod he predicted would go down. On the fourth trial put a heavy weight on a short thick brass rod to stay up and a light weight on a long thin steel rod.) [Why did you use the heavy weight?] I don't think it would bend down. [Why is that?] Because the brass rod is strong. [Yes, anything more?] It can hold a lot of weight. [Why did you put the light weight on the steel?] I think it might bend this rod because the rod is skinny. [Why didn't the steel rod bend as you thought it would?] It wasn't heavy enough. [Why did you use the light weight?] I wanted to see if it would bend it.

Betty (8;2): (A light weight on a long thick aluminum, heavy weight on long thick brass to stay up.) [Why did you use the heavy weight on the brass?] It's strong enough to hold it up I think. [Why did you put the light weight on the aluminum?] So it'll go down. It seems kind of light, as though it'll go down. I'm running out of wood.

(Two heavy weights, on a short thick wood to go down and long thin steel to stay up.) I'm picking the wood to put one of the heavy ones on so it'll go down and the steel is probably strong enough to hold it up.

Tom (7;0): (Light weight on a long thin brass, heavy on a long thick brass to stay up.) [Why are you putting the light weight on this one?] To see if it can hold it. This (thin) one will touch because it's not as strong.

(Light weight to go down on long thick wood, heavy to stay up on short thin aluminum.) [Why the weights?] I want to see if the aluminum

can hold the heavy weight. The wood will touch because it's not as strong as aluminum.

John (7;2): (A light weight to go down on a long thick steel rod, heavy to stay up on a short thin wood rod.) We want to find out if it's weight or longness or shortness. I think the skinny one will go down. Even if we put two heavy weights on the wood it wouldn't sink. Mostly they will stay but the steel will sink the farthest, the other one just a little.

Stephen (7;8): (A light weight on a short thin wood rod to bend and heavy on a thick long aluminum to stay up.) [Why the heavy weight?] The aluminum has to have more power to bend, more heaviness. [Why?] Aluminum is more strong than wood.

(Two heavy weights on a long thin aluminum and short thick wood.) It isn't very heavy or very long. And the aluminum will bend because it's long but it isn't heavy. I want to see if both will stay up or touch bottom.

"I want to see if . . ." just as often accompanied uncontrolled contrast as controlled contrast.

In sum, the notion of holding constant for purposes of testing did not seem to be the most frequent procedure. Holding extraneous variables constant did not at all appear to be in evidence; this process may require conscious analysis of the possible irrelevant variables. It would be of considerable interest to know what experiences will give rise to the use of controls. This experiment was not designed to explore this problem. It would be valuable to discover what range of comparisons the child considers logically equivalent—that is, whether it makes a difference to him, when he says he is testing a contrast, whether the items are controlled on supposedly extraneous variables or not. Piaget's observations that, when so questioned, children may repeatedly insist on tests favorable to their outcome rather than holding relevant factors constant is not completely borne out here; all three possibilities occur, and the reasons for the variations need to be discovered.

Motivational Shifts

The children were instructed to try to maximize difference—to make one rod bend and the other stay level. Yet, for a number of children the definition of the experiment seemed to change. The generating circumstances reveal to some extent the instigations to research.

Jean (8;9): This child was one who had described the light weight that went down on the display pair as heavy. When corrected, she sought a variety of other explanations, e.g., there is a magnet in it.

She used the light weight to go down twice and continued to offer farfetched explanations. On the third trial she suddenly completely reconstructed the procedure and presented two rods with two heavy weights "to see if both go down or both stay up if they have the heavy weights." On the fourth she did the same with the light weights.

This child seemed genuinely troubled by the inconsistency with previous experience.

Sara (8;1), the child preoccupied with hypotheses about the relationship between the heaviness of the rod and of the weight, was another child who

seemed more interested in explanations than in success. After a successful prediction that light rods and light weights would go down, she tested a prediction that light rods and heavy weights would stay up and a heavy rod with a light weight would go down. Her predictions were always framed as "to see if" phrases. Sara described the display pair as a light weight on a light stick and the first test pair was the same. It is not clear why she switched hypotheses. She failed in every subsequent prediction.

George (8;4): After several successful predictions, took a new departure on his fourth test. He presented the clearest example of risk-taking on the heels of success. Weight, thickness, and material strength had been successfully manipulated. After a trial in which he first commented that thickness mattered, he reversed the usual weight and material relations in order to test the role of thickness. He chose a thin steel rod with a light weight to go down and a thick brass rod with a heavy weight to stay up. When asked afterwards why he had chosen these weights and rods, he said, "I wanted to see if it would bend it." Thus, even though his earlier predictions and explanations had indicated that he knew that steel rods bend less than brass rods and heavy weights more than light weights, he made the contrary prediction in this case as a test of the role of thickness.

Peter (7;11): Chose two heavy weights on a thin short steel rod and on thin short wood "because I want to find out which one can hold." Later he put a heavy weight on short thin aluminum "to see if it goes down" and another heavy weight on long thick steel "because I want to see if it goes down."

Tom (7;0): Said he chose a light weight for a long thin brass rod "to see if it can hold it" and later a heavy weight on a thin short aluminum rod "to see if the aluminum can hold the heavy weight." On this trial he predicted the aluminum rod would stay up. In the next trial he put heavy weights on a thick long steel rod and a thin short steel rod and said, "I want to see which one can hold it best." His use of "to see" seems more to imply uncertainty than an active series of experiments.

Sandra (7;5): Emphasized material only on her first two trials and used heavy weights. On the third trial she again contrasted material, but used light weights. "I used light weights to see—I'm sure wood goes down with heavy weights." On the fourth trial, for the first time, she contrasted weights, using the heavy weight on the rod to go down and the light on the rod to stay up.

A series of experiments was conducted by two children:

Stephan (7;8): Noticed on his first effort that weight, material, and length were relevant—an aluminum rod had stayed up, and a short wood rod had bent only slightly with a light weight. On the next trial he chose a thin, long aluminum rod to bend and a short, thick wood rod to stay up, both with heavy weights. He said that both would bend because the wood rod "isn't very heavy or very long and the aluminum rod is long but it isn't heavy." He remarked that he wanted to see "if both will stay up or touch bottom." Note that he uses "heavy" both in the sense of material and thickness here—later on, a thick steel rod is called "heavier" than a thin one.

John (7;2): The most clearly experimental approach was used by this child who described all the characteristics of the display pair systematically and remarked that "the shorter it gets the harder it is to pull down." His consistent use of "we" in describing what he was about to do suggests an imitation of someone else's teaching. In the first contrast he said, "Let's find

a short stick. Both of these are skinny and this one is 1¾ inches longer than that." On the second pair he remarked that he wanted to find out whether it was the weight or longness or shortness that matters. He chose a long thick steel rod to go down and a short thin wood rod with a heavy weight to stay up, remarking that "even if two heavy weights were on the wood it wouldn't sink."

The children had been instructed to maximize short-term success. Their use of common predictions for both rods violated the rules, as did their refusal to predict. In some cases these deviations in favor of "to see if . . ." statements seemed asystematic and to derive from uncertainty and a wish not to commit themselves; in others, they stemmed more from organized curiosity as indicated by deliberate manipulation of variables in the service of curiosity rather than maximum predictive success.

Verbal Questioning

The verbal questions were a test for verbal training primarily. There were two sets: an open-ended question about the characteristics of a rod that sinks, and the restricted questions with certain variables defined as controlled.

The open-ended question tapped the amount of practice in relevant statements about a variable. This would consist of mentioning a variable in relation to the display pair, in predictions, and in explanations. The nonverbal calculus of rewards based purely on the occurrence of a contrast with positive or negative reinforcement should not be effective unless the variable had occurred in an explanation.

Since virtually all the children began with material as a relevant variable, and none mentioned length, thickness is a good test for this hypothesis. There was no association with the number of contrasts involving thickness predicted, or reinforced, or in the consistency of the reinforcement pattern across all instances seen. But, if one examines the children who offered thickness as an *explanation* in some terms during the experiment, then, with only three exceptions, they mentioned thickness in the open-ended question. The relationship is significant beyond the .01 level by χ^2.

To predict what children will say during questioning, it is therefore more pertinent to know what they have said before than to know what they have seen, or at least looked at.

A second set of questions asked what kind of rod would go down and what would stay up, if certain conditions were restricted. With two exceptions, the children who offered thickness as an explanation for this question had two characteristics; they all had separate terms for thickness—that is, did not merge it with length or material in a term like "heavy"—and either commented about it on the display pair or used it in constructing new comparisons. The same properties hold for children who offered thickness as an explanation when asked "What kind of a wooden rod would stay up and what kind of a brass rod would touch bottom?" All

who had separate terms for thickness and constructed new comparisons with it mentioned thickness at this point. In addition, two out of three other children who had noticed thickness and used it in explanations, but never in hypotheses, offered it in this question. Two children who had described short rods as thick offered thickness as an explanation at this point.

The last two questions repeated the display comparison, verbally, and then hypothesized a change in length and thickness and asked the outcome:

> If we had a long, thin, wood rod with a light weight and a short thick brass rod with a heavy weight, what would happen?
>
> Suppose we made the wooden rod shorter and thicker and the brass rod longer and thinner?

There are three possible outcomes, mutually exclusive, if the children are consistent. (a) The child predicts that in both pairs the rod holding the heavier weight will go down. (b) The child predicts that in both pairs the wood rod will go down. (c) The child predicts that the longer or thinner rod will go down.

Material, it will be recalled, was the first thing the children were likely to notice as differentiating the rods. This is a difference they have experienced before as relevant to the breakability and flexibility of toys, so therefore it is probably, to start with, the most obvious variable. Yet only six children cited material as important in making their predictions in this case.

The chief competitor to material as an explanation, for the third graders, was weight. Seven of the children mentioned weight, four exclusively, as the determining factor. Four of the children had been preoccupied with testing hypotheses about weight, in some instances about the relation between heaviness of the rod and of the weight. The three third-grade children who did not mention weight as a determinant included one who had decided it was irrelevant during his trials; George (8;4) who after three successful predictions that the heavy weight and wooden rod would go down became more interested in thickness and made a prediction in which the heavy weight was to stay up, which it did; and Betty (8;2) who ignored weight during all but the first pair and concerned herself entirely with the strength of the rod.

Twelve children used a thickness explanation, some modifying it by some other effect. These were all children without terminological difficulties about the thickness variable, who had used thickness in some form as a hypothesis or commented about it in explanations. The children who failed to use thickness in their hypothetical explanations either had never noticed it or called length thickness or thickness heaviness.

Three variables, then, appear to be relevant to the verbal responses of the children and to their singling out of certain variables as being effective. One is the age or grade of the children. The older, third grade children concentrated on weight more than did the others. Another is the lack of

terminology confounding several variables. A third is whether there had been some prior verbal emphasis on the variable in the form either of prediction, explanation, or both. The actual calculus of reinforcement for choices is not related except insofar as prediction failures lead to explanations referring to particular variables.

Successful Acquisition of Information

If the verbal answers and explanations be examined in order to judge whether each child could predict for an isolated variable the direction of its effect, it appears that three second-graders and six third-graders could probably have been successful with all four variables. A child was judged to "understand" a variable if he did at least one of the following: correctly used the variable in response to verbal questioning; used it correctly in hypotheses, not followed by explicit reversal; used it as a facilitative variable following an earlier explanation, without necessarily mentioning it in his hypothesis; or offered it as an explanation for an effect and subsequently either controlled it or used it facilitatively.

More of the third-graders than second-graders succeeded in discriminating the effects of all four variables, and in each grade the boys' performance was superior to the girls. The three children who only understood two of the variables were girls. There was no difference in Kuhlmann-Anderson IQ between those who succeeded by the above criteria and the others.

It is enlightening to examine the 11 cases of failure to extricate all four variables. Donna (8;9) and Peter (7;11) both confused length and thickness and therefore did not separately note them. Donna systematically chose thick rods to stay up and thin to go down, though her experimental encounters had been with length contrasts. Peter explained a contrast of length as one of thickness and subsequently manipulated thickness and left length uncontrolled. In the questioning he chose a long thin rod to go down and short thick one to stay up, referring to thickness only.

Alice (8;0) did not notice length, or manipulate it, but persistently used "light" and "heavy" to describe contrasts of thickness or length. When asked what kind of wooden rod would stay up and what kind of brass rod would go down, she picked out a thin short brass rod and a thick long wooden rod and said that only the second was heavy and would go down. Sara's extreme terminological confounding did not prevent her from extricating in her choices all four factors.

Two second-grade children happened to make successful predictions whenever the unnoticed variable was left uncontrolled and thus were never under circumstances of noting the extra factor. In the remaining four cases in the second grade, the children did not offer the uncontrolled variable at issue as an explanation when predictions failed. Instead, they gave some other explanation.

Jean (8;9, IQ 112) was the only child to offer rather far-fetched explanations for failures, such as the angle of the holder. She became so highly

focused on the issue of the rule about the weights that she varied widely in her use of material and thickness and never spoke of them to account for failures.

Ann (8;0, IQ 101) showed signs of considerable confusion. She first predicted that a steel rod with a light weight would go down and a wood rod with a heavy weight stay up. When the opposite happened, she said she really had expected that and said that something light "will hold on the heavy." But on the next series she again chose a light weight to go down and persisted thus throughout. She failed to learn from her erroneous weight predictions. She did not take thickness into account either, and she seemed only to notice the "heaviness" of the rod material. She concluded several times that heavy rods and light weights go down, though her verbal responses were inconsistent during the questioning.

At the other extreme was Betty, (8;2, IQ 122) who, through noticing the uncontrolled variables, added later to her observation of material contrasts weight and thickness. She had left length uncontrolled three times and only during the verbal questioning figured out the last variable:

> [Now I want you to tell me what kind of a wooden rod would stay up, and what kind of a brass rod would go down.]
>
> Well a thin, short brass one would go down.
>
> [Why?]
>
> Because it was thin and it was short and it didn't have so much weight to it. And a fat, long wooden one, because it would have a little more weight . . . (inaudible). I was just going to change it to short.
>
> [Why?]
>
> Because I think it would have a little more short than long.
>
> [Why? I don't understand.]
>
> Because if it was long and kind of fat at the end of the weight there would be more but if it were shorter there would be so much weight at the end and I think it would be a little stronger to hold it up.
>
> [What do you mean if it . . . what would happen if it was long?]
>
> If it was long it would be something like this and at the end it would be the weight and it would be because it's long and just one at one end and one weight at one end it would be too much for it. It would go down. But if it was a little short fat one like this one then it would stay up. I think because it would be more closer to the other part and it wouldn't be too heavy. Well it wouldn't be too heavy the weight.
>
> [What do you mean if it was closer?]
>
> Well actually if it was closer it would be more closer to the end and it would probably be more closer to this where it was sticking in into and then it would just be staying up a little better. I can't explain it too good either.

In sum, nine of the children succeeded in identifying the direction of influence of all factors in the limited trials available. The failures which were most frequent were those, all in the second graders, due to overlooking uncontrolled variables in offering an explanation. Next in frequency were confusions of terminology which prevented discrimination of several

variables from each other. Repetition of unsuccessful hypotheses and focusing on too narrow a range of possibilities also occurred. Two children were too successful to learn—that is, they happened to choose contrasts which were successful even though they failed to take several variables into account.

Summary

Twenty second- and third-grade children were presented with a task in which they could succeed best by discovering the relation of four variables to the flexibility of rods. The following generalizations emerged from a content analysis of the choices, hypotheses, and explanations of the children:

1. A number of children confused several variables verbally. This occurred more often in the younger children and interfered in a few cases with successful solutions.

2. There was a difference in the probability that children would make predictions about the different variables or use them in explanations. The fact that a variable might be the only one left uncontrolled did not necessarily result in its early appearance in an explanation of prediction failures. The intrinsic "salience" of the variable seemed more important than whether or not it was the only variable uncontrolled.

3. The older children made more complex hypotheses, stating relationships between the properties of the rod and of the weight which was placed on the rod, rather than isolated statements about the relevance of each variable alone.

4. New variables most often were mentioned first in explanations of failure, but determined choices as often after success as after failure. Success did increase the probability that the following verbal predictions would mention a new variable for the first time.

5. After noticing that a variable was related to flexibility, the children frequently did not control it or vary it in a direction favorable to their prediction. This was not due to forgetting, since such variables often were mentioned later in response to hypothetical questions.

6. Control of unfamiliar variables or of familiar variables for purposes of experiment was rare.

7. Children who stated they were testing hypotheses sometimes controlled known variables, sometimes varied them favorably, and sometimes deliberately varied them in a direction opposed to the prediction. They described the last technique as if it were a test of the strength of the variable.

8. Some children altered the definition of the task, by refusing to make predictions or by testing hypotheses rather than trying to maximize successful predictions as instructed.

9. When the children were presented with hypothetical questions, the actual contrasts they had seen were not predictive of the variables they men-

tioned as relevant. These could be predicted from the explanations and predictions they had offered—that is, from their previous verbal behavior—and from their use of separate terminology for the different variables. In addition, the third graders systematically emphasized the weights more often.

10. According to a criterion of knowledge regarding each variable, three second graders and six third graders extracted the relationship of all four variables to flexibility. Failures appeared to be due to repeating unsuccessful predictions, focusing on a narrow range of hypotheses, terminological confusion, and failure to note an uncontrolled variable in giving an explanation. The last was most frequent.

References

1. Broadbent, D. E. *Perception and communication.* New York: Pergamon Press, 1958.
2. Bruner, J. S., Goodnow, Jacqueline J., & Austin, G. A. *A study of thinking.* New York: Basic Books, 1958.
3. Ervin, Susan M., & Foster, G. The development of meaning in children's descriptive terms. *J. abnorm. soc. Psychol.,* in press.
4. Inhelder, Bärbel, & Piaget, J. *The growth of logical thinking from childhood to adolescence.* New York: Basic Books, 1958.

AN ANALYSIS OF SEX DIFFERENCES IN ADJUSTMENT[1]

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In recent years it has been rather commonplace to find that girls tend to score higher than boys on various adjustment measures. As early as 1929, Wickman (4) reported that teachers observed far more problems in boys' behavior than in girls'. Ullman (3), in 1952, surveyed the research regarding sex differences in adjustment since Wickman. The studies he cites and the results of his own research consistently show higher adjustment scores in girls. On the basis of his data Ullman concluded that there are important qualitative differences in patterns of adjustment for boys and girls. He maintains that the sex differences are due to ". . . the ratio of intrapsychic to 'acted-out' components in the characteristic modes of adjustment of the two sexes" (3, p. 36). Boys' patterns are more overt and manifest, while girls deal with their problems more intrapsychically. He regarded this pattern as especially important in determining teachers' ratings of adjustment, concluding that ". . . teachers award girls more favorable ratings because they lack awareness of the manner in which girls are making their significant adjustments" (3, p. 39). For Ullman, the two chief components accounting for variance between the sexes are differences in modes of adjustment and artifacts of the measurement process. Our purpose in this paper

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is to explore the possibility of an additional component, namely, real differences between the sexes in the *level* of social and psychological integration.

Method

Our data were taken from a large scale study of the outcome of independent adoptions in a southern state.[2] The sample was drawn from a population consisting of white children between the ages of 9 and 15, who were adopted independently in the state between 9 and 12 years ago. Through the administration of a battery of adjustment tests in classrooms containing sample children, data were obtained on the following adjustment variables: withdrawn maladjustment, aggressive maladjustment, leadership, popularity, social adjustment, and personal adjustment. Achievement test data were obtained from school records. Scores on withdrawn maladjustment, aggressive maladjustment, and leadership were based on the Behavior Description Chart, a teacher rating device developed by Bowman *et al.* (1). Popularity was measured by a three-item sociometric preference rating. Social and personal adjustment scores came from the two major scales of the California Test of Personality. Data were available for 410 children, 220 boys and 190 girls.[3]

Before presenting the findings, we wish to emphasize the limitations on their generalizability imposed by the nature of our sample. We cannot assume that adoptive status does not operate to mediate some of the relationships we have found. The findings are sufficiently consistent, however, both internally and with those of previous research, to be highly suggestive.

Results

As a first step in the analysis, sex differences in mean scores on the several adjustment measures were examined. The results appear in Table 1. The differences for adopted children conform to the usual pattern. In six of the seven cases they favor the girls. In four, they are statistically significant in the expected direction. The two largest differences occur on measures for which conformity and control of aggression are important components. However, this does not necessarily imply insecurity or a lack of psychological integration on the part of boys. The measurement process itself may be involved as in the Ullman study. Support could be given to the notion that these differences reflect normal socialization into masculine roles not recognized by the measures.

The second problem addressed in the analysis was that of sex differences in the amount of overlap among the measures. It was hypothesized that

[2] "Independent adoptions" refers to adoptions arranged without the intermediary services of a social agency.

[3] With the exception of achievement test data which were available for 187 boys, 156 girls.

TABLE 1

MEAN DIFFERENCES IN ADJUSTMENT BY SEX

Variable	Boys		Girls		t*
	Mean	*Variance*	*Mean*	*Variance*	
Achievement Tests†	.45	1.79	.66	1.15	1.61
BDC Withdrawn Maladjustment‡	21.14	50.40	21.66	53.60	0.73
BDC Aggressive Maladjustment‡	17.50	65.28	14.62	53.92	*3.78*
BDC Leadership	22.90	85.60	25.86	80.32	*3.28*
Sociometric	17.35	163.00	20.25	181.25	*2.23*
CTP Social Adjustment§	47.27	53.64	51.47	62.55	*5.55*
CTP Personal Adjustment§	48.68	55.62	50.03	55.98	1.82

* All italicized values of t are significant at the .05 level or better.
† Scoring based on difference between expected school grade and actual school grade.
‡ High score indicates maladjustment.
§ Standard scores.

overlap (as indicated by the magnitude of the intercorrelations) should be greater for boys. We believed it likely that situational variability in adjustment is smaller at the lower ranges; i.e., the tendency for convergence among adjustment measures is greatest in cases nearer the maladjusted poles of the continua. Since the average scores of boys were almost uniformly lower, we reasoned that their intercorrelations should be higher.

In Table 2 are the matrices of intercorrelations among adjustment measures by sex. Our hypothesis is not confirmed by the data. While the abso-

TABLE 2

INTERCORRELATIONS AMONG MEASURES OF ADJUSTMENT BY SEX*
(Decimal points omitted)

		Girls (above diagonal)						
		1	*2*	*3*	*4*	*5*	*6*	*7*
1.	Achievement Tests	——	—26	—05	25	30	10	15
2.	BDC Withdrawn Maladjustment†	—13	——	—22	—54	—25	—12	—22
3.	BDC Aggressive Maladjustment†	—33	—31	——	—62	—19	—17	—11
4.	BDC Leadership	—29	—39	—78	——	30	26	24
5.	Sociometric	32	—37	—17	39	——	07	12
6.	CTP Social Adjustment	27	09	—29	19	16	——	80
7.	CTP Personal Adjustment	29	07	—25	15	30	73	——
		Boys (below diagonal)						

* $r_{.05} = .116$.
† High scores indicate maladjustment.

TABLE 3

MEAN DIFFERENCES IN CHARACTERISTICS OF HOME ENVIRONMENT BY SEX

Variable	Boys		Girls		
	Mean	Variance	Mean	Variance	t*
1. Socioeconomic Level of Neighborhood†	2.43	.419	2.46	.366	0.48
2. Parents Separated or Divorced	.15	.125	.17	.141	0.69
3. Parents' Conception of Child's Disposition†	2.65	.283	2.65	.251	0.00
4. Parents' Conception of Child's Preference for Peers as Companions†	.88	.101	.91	.078	1.00
5. Parents' Satisfaction with Child's School Performance†	2.96	1.226	3.31	.850	*3.50*
6. Frequency of Discipline†	1.76	.293	1.59	.296	*3.40*
7. Frequency of Pleasurable Activity with Mother†	1.41	.481	1.53	.441	1.79
8. Frequency of Pleasurable Activity with Father†	1.46	.459	1.22	.752	*3.08*
9. Social Work Rating of Home Quality	3.22	1.891	3.25	1.713	0.23
10. Social Work Rating of Marital Relations	3.57	1.479	3.54	1.382	0.25
11. Parents' Difficulty in Supervising Child	1.25	.921	1.06	1.176	1.90
12. Physical Punishment Employed	.45	.248	.38	.238	2.92

* All italicized values significant at the .05 level or better.
† Means adjusted for direction of coding so that high scores for all variables indicate (a) favorable attitude or (b) high frequency of characteristic.

lute values of the boys' intercorrelations are higher in the majority of cases (13 out of 21), the pattern could have occurred on the basis of chance alone.

Differences in patterns of upbringing are sometimes invoked to explain the relationship of sex to adjustment level. Data on childrearing attitudes and practices and on characteristics of the families were obtained from intensive interviews with the adoptive mothers made by social workers. In the main study, 12 such variables were found to be significantly correlated with one or more of the adjustment measures for the total sample. Differences in these variables by sex of child were investigated. The results appear in Table 3. In four cases the differences were statistically significant.[4] In

[4] When a number of individual comparisons are made, some would be expected to turn out "statistically significant" on the basis of chance alone. For example, on the assumption of independent samples, the probability of at least one significant difference out of 12 comparisons, using the .05 level, is .46 ($1 - 0.95^{12}$). The probability of at least four significant differences is less than .01. The same problem applies to the data in Table 4 where 12 out of 84 comparisons were statistically significant. Applying the same approach, this number significantly exceeds that to be expected by chance alone. Of course, the assumption of independent samples has not been met so that these probability values are only suggestive. Moreover, a "significant" number of significant differences does not guarantee against spuriousness in any of the individual comparisons nor can it point out which are spurious results. This can be determined only through replication.

TABLE 4

CORRELATIONS BETWEEN HOME ENVIRONMENT VARIABLES AND ADJUSTMENT MEASURES BY SEX*
(Decimal points omitted)

Variable	Achievement		BDC-Withdrawn		BDC-Aggressive		BDC-Leadership		Sociometric		CTP-Social		CTP-Personal	
	Boys	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*	*Boys*	*Girls*
1. Socioeconomic Level of Neighborhood†	*27*	*05*	−01	−09	−01	−03	−10	02	10	00	06	11	14	13
2. Parents Separated or Divorced	01	10	*−08*	*12*	13	−06	−03	−01	05	−13	−07	−11	−15	−18
3. Parents' Conception of Child's Disposition†	12	06	01	01	−25	−28	24	20	*24*	*−05*	15	−01	16	03
4. Parents' Conception of Child's Preference for Peers as Companions†	04	11	03	−02	−13	−01	10	14	10	05	17	11	20	12
5. Parents' Satisfaction with Child's School Performance†	*−40*	*14*	−23	−15	−37	−29	48	34	34	28	26	21	26	20
6. Frequency of Discipline†	−14	−26	−11	−01	*35*	*14*	−19	−19	−14	00	−18	−08	−15	−18
7. Frequency of Pleasurable Activity with Mother†	−24	−12	−04	12	−18	−25	*−19*	*09*	*−18*	*09*	19	14	12	13
8. Frequency of Pleasurable Activity with Father†	07	−04	−12	05	−12	−12	16	06	*33*	*06*	*37*	*01*	*26*	*04*
9. Social Work Rating of Home Quality	17	21	−19	−10	−17	−14	27	16	26	14	22	20	29	17
10. Social Work Rating of Marital Relations	14	19	−16	−09	−17	−14	24	15	16	13	25	17	27	12
11. Parents' Difficulty in Supervising Child	*−21*	*04*	09	−01	18	13	−22	−12	*−22*	*00*	−20	−02	−15	−01
12. Physical Punishment Employed	−09	06	−00	−00	07	10	−06	−11	01	−06	−10	−00	−13	−10

* Italicized pairs indicate that the difference between correlations is significant at the .05 level or better ($r_{.05} = .116$).
† Signs changed to adjust for direction of coding.

three of these, attitudes toward the child's school performance, frequency of discipline, and the use of physical punishment, the direction of relationship with the adjustment measures is such that the differences favor the girls. If these variables were held constant when comparing average adjustment scores, the sex differences would be considerably diminished. One variable, frequency of pleasurable activity with the adoptive father, actually favored the boys. Holding it constant would result in *increasing* sex differences in adjustment. However, this would not completely cancel the joint effect of the other three.

Because of the nature of the study design, the logic of such a partialing procedure is not completely satisfied. In holding a variable constant, the implicit assumption is made that it operates as an independent variable. Since our measures of adjustment and of parental attitudes and practices are concurrent, the study provides no empirical justification for that assumption. It could be rationally argued that parental attitudes and practices are as much a *response to* as a cause of the child's adjustment status.

There is another way in which childrearing attitudes and practices can operate to produce sex differences in adjustment. Differences between the sexes may exist in the extent to which adjustment is responsive to variations in parental handling. The coefficient of correlation between adjustment scores and a particular parental attitude or practice serves as a measure of level of responsiveness to that attitude or practice. Correlations were computed between the 12 parental variables and each of the seven adjustment measures by sex. This produced the 84 pairs of correlations appearing in Table 4. In order to test the hypothesis of sex differences in responsiveness, the absolute values of the correlations in each pair were compared and the direction of the difference noted. The absolute values of the boys' correlations were higher in 62 out of 84 pairs.[5] Applying the sign test to these data, the disproportion was found to be statistically significant.[6]

Discussion

At the core of our interpretation of these findings is Durkheim's (2) notion of the relationship between norms and the psychological integration of the individual. From this point of view, clarity and consistency of societal expectations toward the individual's behavior are a major source of psychoogical support for him. We hypothesize that the socialization process in contemporary America is so organized that expectations toward girls' behavior tend to be more clearly defined and more consistent than is the case for boys in this age group.

Both access to appropriate adult identification models and opportunities for playing portions of their roles tend to favor girls. In the family, girls

[5] In 12 of the 84 pairs, the differences between boys' and girls' correlations were significant. In 11, the boys' were higher.

[6] $z = 4.24$, $p < .01$.

have more opportunities to interact with their mothers than boys do with their fathers. The pattern is about the same in the school situation. For boys, the most accessible adult models, such as mothers and teachers, are inappropriate. Too much interaction with mothers, for example, tends to be disapproved as "sissy-like" or being a "mama's boy." "Teacher's pet" or "brown nose" are the corresponding labels in the school situation. At the same time, boys are blocked from taking on significant portions of what is socially defined as appropriate male behavior, such as being aggressive, dominant, or exercising authority. A boy is not regarded as "all boy" unless he exhibits some overt aggression although the situational opportunities are few and the situational limitations far from clear-cut.

When some of the specific pairs of correlations are examined, empirical weight is given to our hypothesis of the importance of access to appropriate adult identification models. Especially relevant are sex differences in the relationship of adjustment to the frequency of shared pleasurable activity with each parent. Two patterns emerge when examining the 14 pairs of correlations for these two variables (lines 7 and 8 in Table 4). First, for each adjustment variable, correlations tend to be higher with the parent of the same sex. Second, frequency of pleasurable activity with the adoptive mother is not uniformly associated with good adjustment. This is most heavily pronounced for boys in the negative correlations with achievement tests, leadership, and the sociometric ratings. At least theoretically, these three variables involve traits such as high levels of aspiration and assertiveness which are generally associated with masculine identification.

We recognize, of course, that our major line of interpretation is highly speculative. It is dependent on both the correctness of Durkheim's thesis and the empirical accuracy of our assumptions concerning differences in normative consistency and their effects. However, if both are correct, girls would be relatively more "buffered" by consistent social norms regarding their behavior, and consequently their adjustment would be somewhat less dependent upon quality of parental handling.

Summary

Sex differences in adjustment among adopted children were explored. Mean scores on seven adjustment measures were compared. The results conformed with those of most previous research in this area. Differences favored the girls in six of the seven cases, four being statistically significant. Intercorrelations among the seven measures of adjustment were computed by sex. No reliable trend in the amount of overlap among the measures by sex was observed. Using data from home interviews, sex differences in 12 home environment variables were analyzed. In four cases the differences were statistically significant. In three, the direction of the differences would result in higher adjustment for girls. However, the interpretative significance of these variables was not clear since one could not establish that they

were temporally primary in their relationship to adjustment. Correlations between the 12 home variables and the seven measures of adjustment were computed by sex. There was a significantly consistent tendency for the boys' correlations to exceed those of the girls', indicating that the adjustment of boys tends to be more responsive to variation in the home environment. The interpretation offered for these findings was primarily sociological in emphasis. It was contended that norms for girls tend to be more consistent, clear-cut, and consonant with avenues of behavior open to the child than is the case for boys. Theoretically, this should lead to better social and psychological integration.

References

1. Bowman, P. H., *et al.* *Mobilizing community resources for youth.* Chicago: Univer. of Chicago Press, 1956.
2. Durkheim, E. *Suicide.* Glencoe, Ill.: Free Press, 1951.
3. Ullman, C. A. *Identification of maladjusted school children.* Washington, D.C.: Public Health Monograph No. 7, 1952.
4. Wickman, E. K. *Children's behavior and teachers' attitudes.* New York: Commonwealth Fund, 1929.

QUANTITY SERVED AND CHRONOLOGICAL AGE AS FACTORS IN QUANTITY OF MILK CONSUMED BY PRESCHOOLERS[1]

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Physicians, teachers, and parents are oftentimes confronted with the rather complex and practical problem of "getting the child to drink his milk" with a minimum of coaxing. In surveying general references in child development and nutrition, it was typical to find undocumented statements implying that, the smaller the portion, the more the child would consume. Whether or not liquid or solid foods were involved seemed to make no difference with respect to such implications. A survey of research literature revealed no systematic experiments dealing directly with the topic at hand, although two studies deserve comment. Experimental work by Bayer (1), as reported by Stone (5), demonstrated that hens who had undergone 24 hours of food deprivation ate more from larger heaps of grain than from smaller heaps. Mirone, Torrance, and Roughton (4) presented evidence

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that milk consumption by nursery school girls was a highly significant negative function of solid food intake ($r = -.83$) but not so for boys ($r = -.02$).

The specific purposes of the present experiment were to test the significance of the difference between mean quantities in milliliters of milk consumed (a) by junior vs. senior groups of preschool children, as defined by chronological age; (b) under conditions of a small serving vs. a large serving; and (c) at various time points during the course of the experiment. Also of specific interest was the possible occurrence of significant interactions among the three sets of variables.

Method

Subjects

The *Ss*, enrolled in a university nursery school in East Tennessee, were from predominantly middle-to-upper socioeconomic strata, most being children of professionally employed parents. Table 1 includes the basic description of the 32 *Ss* used.[2] On an average basis there was more than a one-year CA difference between the juniors (Jrs) and seniors (Srs). The two oldest Jrs, both 4.1 years, were older than the youngest Sr who was 3.9 years.

TABLE 1

DESCRIPTION OF SUBJECTS

Group	Number of Cases			CA (years)	
	Boys	*Girls*	*Total*	*Mean*	*Range*
Juniors	8	8	16	3.4	2.8–4.1
Seniors	10	6	16	4.5	3.8–4.8

Experimental Design and Procedure

The experiment was designed and conducted as a three-factor analysis of variance described by Lindquist (3, p. 281) as Type III. The major variables were age of *Ss*—Jr, Sr; quantity of milk served—40 ml., 120 ml.;

[2] The total enrollment was actually 35; two *Ss*, one junior and one senior boy, were eliminated at random from the other boys in their respective groups to render the sex distributions as equal as possible and to provide for equal subgroup numbers in the analysis of variance design. One junior girl was eliminated because she required individual feeding from the head teacher. These eliminees underwent experimental treatment and random assignment procedures to be described in Method, so that the actual elimination occurred at the close of the experiment.

and the effect of the quantities served to the Jrs and Srs during the first half of the experiment versus the last half—day blocks I and II.

Half of the *Ss* of each sex were randomly assigned to one of the two quantity conditions to control for possible sex differences and their associated factors.

The experiment, begun on April 9, 1957, lasted through May 24, 1957, a period which included 31 experimental days. The number of ml. of milk *S* consumed was recorded each day he was present. Experimental treatments were started one school week prior to measurement to accustom *Ss* and participating adults to new routines.

Dining room arrangement. The Jrs and Srs had their noon meals at separate times in the same dining room. There was one adult and approximately three *Ss* at each table. All *Ss* at a given table underwent the same quantity treatment (120 or 40 ml.). Every effort was made to control seating positions by random assignment procedure. Except for undergraduate assistant teachers, who were present according to various alternating schedules, all adults maintained the seats assigned to them originally. The seating arrangements for the children were also maintained except for occasional and temporary changes due to absences.

Instructions to adults. Adults received three instructions: (a) to make *no* mention of milk and in no way to coax or to suggest that *S* drink his milk; (b) to refill empty glasses only and when refilling to pour the milk up to the given *S*'s quantity level; to refill only upon request from *S*—thus, to the knowledge of *E, the experiment was carried out strictly under a non-coaxing or laissez faire condition*; and (c) to record on a special pad, placed on a small serving table at each adult's side, the number of times she refilled a given *S*'s glass to its appropriate quantity level. The essentials of the foregoing instructions and her *Ss*' names were placed on her record pad prior to each experimental day.

When *S* spilled his milk, the adult recorded "spill" if *S* had drunk from the same serving before spilling, and he received no criterion score for the day. If, however, *S* spilled part or all of a full serving before he had drunk from it, then the adult refilled the glass to its appropriate level.

Measurement. Translucent plastic drinking glasses of approximately 150 ml. capacity were used. The quantity level to which they were to be filled had been marked carefully. During and following the meal, *E* remained in the kitchen adjoining the dining room to monitor and compute the criterion scores for the day.

Results

In general, the entire experiment proceeded smoothly without occurrences of experimentally disturbing incidents. Adults were instructed how to answer *S*'s questions about partially filled glasses in a neutral fashion.

One older *S* in a 40 ml. condition at first protested the partial serving but quickly adjusted.

Absences and Spills

The total number of possible measurements for all *S*s combined was 32 *Ss* × 31 days = 992. The total number of absences, due primarily to illness, was 142, ranging from zero to 13 with a mean (M) of 4.4 and a median (Mdn) of 3.2. The total number of spills was 14, 10 in the Jrs and four in the Srs. The total number of absences plus spills was 156 ranging from zero to 13 with a M of 4.9 and a Mdn of 3.9; they were distributed approximately evenly among the four subgroups.

Analysis of Variance

The initial plan was to make the analysis in terms of several blocks of consecutive days, but the nature of the frequency and distribution of absences and spills prevented this. Various day-block combinations were considered, the details of which may be obtained from the author. It was decided that the most realistic and conservative alternative was to base the analysis on the mean of a given *S*'s available scores for each of two blocks of days: block I, composed of the first 15 days, and block II, composed of

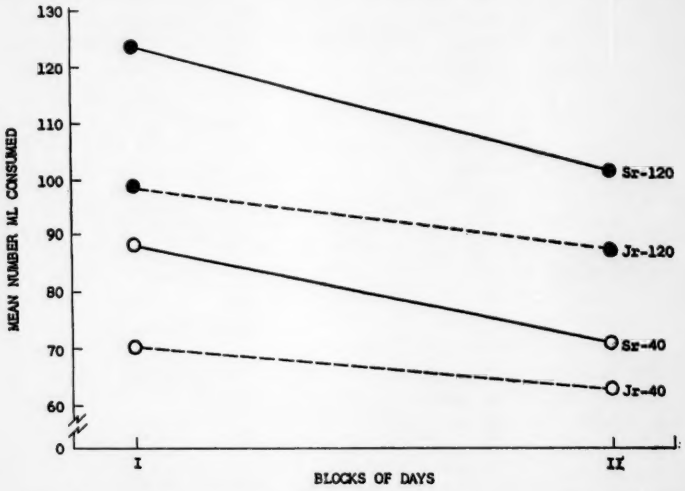

FIGURE 1—Mean number of ml. of milk consumed by each of the four subgroups from the first block of 15 days (I) to the second block of 16 days (II). Closed circlets—120 ml. groups; open circlets—40 ml. groups; solid lines—Sr groups; and broken lines—Jr groups.

the second 16 days. In block I the number of daily measures, upon which the *S* criterion mean was based, ranged from 8 to 15 with a M of 12.6 and a Mdn of 12.9. In block II the corresponding statistics were: range, 9 to 16; M = 13.5; and Mdn = 14.9.

The means of the eight individual cells of the experimental schema have been plotted in Figure 1. An inspection of the trend lines showed: (a) There was a decisive downward trend in consumption from the first to the second block of days. Eight *S*s, approximately evenly distributed throughout the four subgroups, consumed more during the second than during the first block of days. (b) The four trend lines were well separated, did not intersect, and were relatively parallel. Lastly, (c) it can be noted that the Sr - 120 ml. subgroup was highest, the Jr - 120's second, the Sr - 40's third, and the Jr - 40's lowest.

A summary of the analysis of variance, incorporating the statistics of Figure 1, is shown in Table 2. The major experimental results, as shown in the *F* column of Table 2, were: (a) There were no statistically significant interactions; hence the differences were tested between the means included under a given main experimental variable (Age, Days, or Quantities) disregarding the two remaining variables. The Ms and SDs of the two treatment categories of each main variable are given in Table 3. (b) There were clear differences in the quantities consumed such that the 120 ml. *S*s drank more in terms of mean amount than the 40 ml. *S*s (102.8 ml. as compared to 73.1 ml.). (c) The *S*s also consumed significantly more during

TABLE 2

SUMMARY OF ANALYSIS OF VARIANCE

Source of Variation	*df*	*Mean Square*	*F*
Between *S*s	31	3536.63	
Age (A)	1	4150.58	1.27
Quantity (Q)	1	14101.56	4.33*
A × Q	1	144.61	< 1.00
error (b)	28	3258.53	
Within *S*s	32	472.65	
Day (D)	1	3329.29	8.26**
D × A	1	439.95	1.09
D × Q	1	68.89	< 1.00
D × A × Q	1	2.48	< 1.00
error (w)	28	403.01	
Total	63	1980.33	

NOTE.—Coefficient of risk of $p = .05$ used for all *F* tests.
* $p < .05$.
** $p < .01$.

the first half of the experiment (M = 95.2 ml.) than during the last half (M = 80.7). Lastly, and somewhat to *E*'s surprise, (d) there were no significant differences between age levels in mean amounts consumed.

TABLE 3

MEAN NUMBER OF MILLILITERS CONSUMED UNDER THE THREE MAIN TREATMENT CONDITIONS

Statistic	*Day Block***		*Age Group*		*Quantity**	
	I	II	Jr	Sr	40 ml.	120 ml.
Mean	95.2	80.7	79.9	96.0	73.1	102.8
Standard deviation	46.5	40.4	40.8	45.9	38.4	44.5

NOTE.—Each mean based on 32 scores.
* Difference between the two treatment means significant at $p < .05$.
** Difference between the two treatment means significant at $p < .01$.

DISCUSSION

The significant quantity and day effects were the most striking. The following discussion consists of an interpretation of these two findings from both the theoretical learning and practical standpoints.

In *E*'s judgment, the significant downward trend in consumption for all four subgroups may best be accounted for in terms of the institution of the laissez faire treatment. For two academic quarters immediately preceding the experiment, the dietitian (also employed during the experiment itself), who sat at the front of the dining hall, had rigidly enforced the policy that *S* must consume one glass of milk (approximately 120 ml.) before he could receive any dessert. Furthermore, *S* must consume a second glass of milk before he could receive a second serving of dessert. If *S* desired a second dessert, he was required to obtain it directly from the dietitian. When *S* completed his meal, he was required to bring his dishes to the dietitian's desk and place them on a serving tray to be removed to the kitchen. It was relatively easy for the dietitian to administer conformity to the milk-drinking policy and to take the necessary action should an attempt be made to violate it. It was obvious to *E* as well as to other adults connected with the experiment that *S* was indeed hesitant to approach the dietitian's desk lacking an empty milk glass. This anxiety response showed up especially during the first few experimental days and waned thereafter. It seemed reasonable to suppose then that, during the pre-experimental period of some six months, *S* had acquired a habit of drinking at least one glass of milk under a relevant motivational state of "avoidance of censure." Then, when the removal of the need to avoid censure occurred at the outset

and during the experiment proper, *E* contends that drive level decreased which in turn led to a response decrement, a theoretical point of view held by reinforcement learning theorists.

The fact that the decrement was systematic for all subgroups lends additional support to the above interpretation; that is, the relatively parallel downward trends suggested the operation of some constant source of variation common to all subgroups, a source which *E* hypothesizes as being the removal of the need to avoid censure. It is realized that sources of variation other than that hypothesized (e.g., liquid content of food, solid food intake, etc.) were also confounded with days and could have had systematic effects on the criterion scores. However, there were no obvious reasons to suspect such factors as those cited in addition to others as being responsible for the obtained trends. For all practical purposes, menu and solid food intake were considered to be random effects.

The question now arises as to an interpretation of the other principal finding that the "larger" portion subgroups consumed significantly more than the "smaller" portion subgroups. This finding, incidentally, was consistent with that of Bayer's (1) cited earlier in connection with hens. From the standpoint of learning theory, *E* would hypothesize that the result under consideration could best be interpreted as being principally a phenomenon of stimulus generalization. More specifically, during the six-month pre-experimental period, *E* assumes that *S* acquired the habit of drinking his milk in terms of an approximate 120 ml. glass stimulus condition—recall the milk-drinking policy. *E* is interpreting the consumption of a 120 ml. glass of milk as being basically the point of "original conditioning" on the ml. stimulus dimension. According to the principle of stimulus generalization (2, p. 86) then, one would expect lowered consumption if *S* were presented with a stimulus within the same dimension and adjacent to the point of original conditioning. During the experiment the 120 ml. treatment would be considered as a control, since the prior 120 ml. treatment was continued (except for the laissez faire condition which was assumed to be a constant effect on all *S*s irrespective of treatment), and the 40 ml. treatment was construed as being the "adjacent" stimulus. Therefore, if the underlying pre-experimental assumptions are correct, then the empirical evidence is consistent with the concept of stimulus generalization.

To prevent possible misinterpretation, the chief limitation of the experiment in accounting for the two major findings, from the standpoint of confirming the learning principles cited above, is the fact that it was neither initially nor specifically designed to test such principles. Undoubtedly, an *E* specifically interested in testing such principles in a similar setting would exercise rigid controls during acquisition of the consummatory response, that is, during the pre-experimental period in the present case.

The practical implications of the results are perhaps more complex than would appear on the surface. The study answers only a few questions;

we cannot say that "Preschoolers drink more milk if served full portions rather than small portions." On the basis of the results, however, one is justified in speculating that *Ss* similar to this group could be expected to consume an average of about 30 ml. more under a 120 ml. condition than under a 40 ml. condition.

In conclusion, and in regard to adult control, the present experiment offered some evidence pertaining to the "authoritarian" versus the "laissez faire" methods. That is, there was little question that *S* consumed considerably more under the authoritarian policy. However, it must be remembered that the laissez faire treatment immediately *followed* the authoritarian; what the effect on consumption would have been had the conditions been reversed in order or conducted independently is a moot question empirically. The particular policy one wishes to use, whether it be "authoritarian," "laissez faire," or some degree of compromise, is of course a question of value to be decided by individuals other than the scientist *qua* scientist. In the present stage of knowledge concerning such matters, only partial consequences of the use of various policies can be offered.

Summary

The purpose was to test the effects of serving differing quantities of milk (120 ml. versus 40 ml. portions) to two preschool age levels (juniors versus seniors). A three-factor analysis of variance design, Quantity × Age × Days, was used. The middle-to-upper socioeconomic sample was enrolled in a university nursery school and consisted of 32 *Ss* equally divided between the two groups. The mean ages of the Jrs and Srs, respectively, were 3.4 and 4.5 years. Half of each sex in each of the two groups was assigned at random to one of the two milk-quantity conditions, thereby resulting in four subgroups. The number of ml. of milk consumed by each subject over each of 31 days under the above treatment conditions was recorded. The experiment was conducted under a laissez faire milk-drinking condition. The two criterion scores for each subject were the mean ml. consumed during the first 15 experimental days and the last 16 experimental days.

The analyses yielded the following major results: (a) no statistically significant interactions; (b) statistically significant higher mean consumption under the 120 ml. treatment (M = 102.8 ml.) than under the 40 ml. treatment (M = 73.1 ml.); (c) statistically significant higher mean consumption during the first 15 days (M = 95.2 ml.) than during the last 16 days (M = 80.7 ml.); (d) no statistically significant difference between age level means. The results were discussed from the standpoints of theoretical learning principles and practical implications.

References

1. Bayer, E. Beiträge zur Zweikomponententheorie des Hungers. *Z. Psychol.*, 1929, 112, 1-54.

2. Hull, C. L. *Essentials of behavior.* New Haven: Yale Univer. Press, 1951.

3. Lindquist, E. F. *Design and analysis of experiments in psychology and education.* Boston: Houghton Mifflin, 1953.

4. Mirone, L., Torrance, V. E., & Roughton, C. W. Food intake of nursery school children at noon. *J. Amer. diet. Ass.,* 1956, 32, 707-709.

5. Stone, C. S. Motivation: drives and incentives. In F. A. Moss (Ed.), *Comparative psychology.* New York: Prentice-Hall, 1934. Pp. 73-112.

A STUDY OF SOME DETERMINANTS OF AGGRESSION IN YOUNG CHILDREN[1]

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The frustration-aggression theory of Dollard, Doob, Miller, Mowrer, and Sears (3) presented aggression as a natural and inevitable consequence of interference with, or blocking of, a goal response. Although the major postulate of the frustration-aggression hypothesis has required modification, its corollary, that aggression presupposes the occurrence of frustration, has been widely accepted (5). Studies of child-training practices (e.g., 1, 7, 8, 10) have provided some supporting, if not always consistent, evidence for this latter hypothesis. Such studies suggest, however, that the extent to which aggression is manifested depends not only upon the degree of frustration that a child experiences, but also on the effectiveness of the parents' training into social conformity. Early in the child's life measures are taken to curb the development of aggression by threatening the child with punishment or loss of love. Even as aggressive patterns of behavior are being learned, aggression is being partially inhibited or channeled into more socially accepted forms.

One consequence of the development of inhibitions is the displacement of aggression to objects other than the original frustrator. Thus, a child who is frustrated by its parents may displace aggression to a sibling or a toy. Analogously, one might expect a child who is frustrated by an adult in a school setting to displace aggression to playthings in his environment. The extent to which displacement occurs may be thought of as a joint

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[1] This study is based in part on a thesis submitted by the first-named author in partial fulfillment of the requirements for the degree of M.A. at the University of Toronto. The authors wish to express their appreciation to Dr. W. E. Blatz and the staff of the University of Toronto Institute of Child Study for their cooperation in this study.

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function of the strength of the instigation to aggression and the strength of competing inhibitory responses (6). If one imagines a continuum of objects of increasing dissimilarity to the frustrator, one might predict that, given an equal amount of instigation to aggression, children with weak inhibitions would tend to give more aggressive responses and to show less displacement of aggression along the dissimilarity continuum than would children whose inhibition is strong. In terms of Miller's model, one might say that the socialization process aims to keep the gradient of inhibition higher than the aggression gradient.

Whiting and Child (10) predicted that the relationship between the strength of aggressive responses and the strength of anxiety could be reversed for extremely displaced responses; i.e., a condition of high anxiety might result in increased aggression through the summation of conflict-produced drive and the original (aggressive) drive. A similar process was assumed to occur by Brown and Farber (2) in their treatment of frustration as an intervening variable. Bandura and Walters (1), reinterpreting strength of response in terms of probability of occurrence, found some evidence for the operation of conflict-produced drive in a comparison of the aggressive responses of aggressive and nonaggressive boys to their parents, teachers, and peers.

The present study is an attempt to manipulate the variable of frustration and to note its effects on children with differing levels of anxiety and guilt about aggression. Hypotheses were developed without reference to the conflict-drive theory, but with the awareness that, if this theory were assumed, the following hypotheses would require modification.

1. Children who respond with much anxiety and guilt to aggressive acts are less likely to display aggression following frustration than are children who respond with little anxiety and guilt to aggressive acts.

2. Children who display high anxiety and guilt about aggression tend to displace aggression to a greater extent than do children who display little anxiety and guilt about aggression.

3. Children show more aggression under conditions of high frustration than under conditions of low frustration.

4. Under conditions of high frustration the aggressive responses of children will be less displaced than under conditions of low frustration.

Although there are probably predictable differences between guilt-controlled and fear-controlled children (1, 8, 10), for the purpose of this study control by fear (anxiety) and control by guilt were regarded as equivalent.

Method

Selection of Subjects

Subjects (*Ss*) were selected by means of a test for level of anxiety and guilt about aggression. This test consisted of a series of four cartoon-like drawings depicting a child behaving in an aggressive manner toward another

child. There were two sets of pictures, set A for boys and set B for girls.[2] To allow *Ss* to identify with the aggressor, the main character in set A was a boy, while in set B the main character was a girl. As each illustration was presented to *S*, the situation was structured by *E* so that *S* would understand clearly that the main character was behaving in an aggressive manner. To picture 1, for example, *E* said:

> You see this little boy who is slowly walking up behind this little girl. She is just finishing her house of blocks. He is just about to knock those blocks down and scatter them all over the floor. This is what he does. He knocks them all down.

The introductory statements were given in a matter-of-fact tone of voice to avoid giving *S* the impression that *E* approved or disapproved of aggressive behavior. *E* then paused long enough to give *S* an opportunity of talking about the picture spontaneously. If *S* did not respond, or if his response did not yield the required information, the following three questions were presented in a standard order:

1. How did this boy (or girl) feel after he had done this? (*E* points to the aggressor in the picture).
2. What did he say?
3. What did he do then?

Ss' responses were recorded on a tape recorder, transcribed, and then scored for guilt content. Eight categories, similar to some of those used by Heinicke (4) and Bandura and Walters (1), were used in scoring:

1. *Self-blame or remorse.* Any statement suggesting that the agent of an aggressive act is at fault, has committed wrong, or feels sorrow or remorse for aggression, e.g., "He would go up to her and make friends with her and say he was sorry."
2. *Self-punishment.* Any statement implying that the agent is punishing himself for his act of aggression, e.g., "He will get hurt and his wagon might get wrecked."
3. *Reparation.* The agent tries to restore the situation or perform some act of conciliation to regain favor, e.g., "He will build the blocks up the way they were before."
4. *Denial or excuse.* Any rationalization or justification of aggressive acts, e.g., "The little girl hit the big girl because she wouldn't listen to her."
5. *Confession.* Any spontaneous confession of an aggressive act, e.g., "He goes and tells the other boy's mother and she is not very happy about it."

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[2] The pictures for male *Ss* were developed by Dr. Albert Bandura for use in USPH Project M-1734. The parallel pictures for girls were designed specifically for use in this study. The pictures have been deposited as Document number 6392 with the ADI Auxiliary Publications Project, Photoduplication Service, Library of Congress, Washington 25, D.C. Copies may be secured by citing the Document number and by remitting $1.25 for photoprints, or $1.25 for 35 mm. microfilm. Advance payment is required. Make checks payable to: Chief, Photoduplication Service, Library of Congress.

6. *Retribution.* Punishment for aggression by an impersonal agent, e.g., "The other boy ran away and he tripped on a string."

7. *Hiding or concealment.* Any attempt made by the aggressor to hide from the consequence of an aggressive act or to cover up an offense by lying or otherwise concealing the facts.

Each *S*'s score was simply the total number of guilt and anxiety responses that occurred in his protocol. Scoring was done by the authors in conference, since one author was the more experienced in the use of the categories. In a previous study (1) the median reliability of this type of scoring was .86.

The pictures were presented to 22 boys and 23 girls in kindergarten and grade 1. *Ss*' ages ranged from 4 years, 10 months, to 6 years, 8 months. The three girls and the three boys who scored highest in each grade were selected as high in guilt; the three boys and three girls who scored lowest in each grade were selected for the low-guilt group. *Ss* in the two groups were thus matched for sex and, as closely as possible, for age. Each group was then divided into two subgroups (high-frustration and low-frustration) in such a way as to maintain an age and sex balance.

Procedure

S was brought to a playroom and was asked to sit down at a table on which was placed part of a pack of Tom Thumb playing cards and two prizes, a large green shamrock-shaped lollipop and a small stack of three jelly beans. *E* explained the presence of an assistant rater, who was sitting in the far corner of the room, and then proceeded to give instructions:

> This is Miss X. She is very busy doing some work so we will not disturb her. Now we are going to play a little game here all by ourselves. This is a pack of playing cards, as you see. Now, you see this card (pointing to the joker). To win this game you must get the card that is the same as this one. If you win, you can choose your prize. It can be a lollipop or these three candies, whichever you like best.

E then split the pile of cards in front of her into two approximately equal piles, gave the top half to *S*, and kept the bottom half. Before the beginning of the experiment, the "lucky" card had been placed very close to the top half of the pack. *E* then said, "Let's look through these cards and see who has the lucky card." Both *E* and *S* looked through their cards and, as prearranged, *S* found the lucky card in his pile.

E then said, "You can have the prize you like best, the lollipop or three candies." *E* made a note of *S*'s preference (in every case, the lollipop) and placed the prize to one side, but within reach of *S*.

The game was repeated, the lucky card this time consisting of two aces and the prize being the less preferred candy. Again, *S* was allowed to win the prize.

According to the design of the experiment, *S* had been assigned to either the high-frustration or the low-frustration group. High-frustration *Ss* had the more preferred candy taken away from them without any ex-

planation. Low-frustration *S*s had the less preferred candy taken away from them in a similar manner. *E* left the remaining candy in a conspicuous place on the table and indicated to *S* that this was his candy. No mention was made of the other candy which had been put out of sight so that there was no mistaking which of the two prizes now belonged to *S*. *E* then said, "I will give you this candy when you go out." *E* put the candy aside, but in an easily accessible place, so that *S* knew that this candy would not be taken away from him. *S* was now led to the center of the room where the objects of aggression, until now hidden from sight, were uncovered. One object was an inflated plastic punch-bag, approximately 36 in. in height, on which was painted the figure of a child of indeterminate sex. The other object was a black and white stuffed dog, 6 in. in height. *S* was told: "Now you can play with these toys for a few minutes while I finish up some work I was doing and then, right after, I shall take you back to your class."

E gave the doll a slight push to indicate that it would move if manipulated and began the timing and recording of aggressive (hitting) responses 5 sec. after she had touched the doll. *E*'s push served also as a signal for *E*'s assistant, who had been sitting unobtrusively in the far corner, to wait 5 sec. and then begin recording the number of times *S* struck the toys.

S was observed by the two raters for an 8-min. period. At the conclusion of the play period, *S* was given his candy and taken back by *E* to his classroom. *E* attempted at this point to find out how *S* felt about losing his prize and to say something that might alleviate the situation. High-frustration *S*s manifested signs of anger or chagrin, offered rationalizations, or asserted their indifference to the loss of the lollipop. There was no *S* in this group who seemed unaffected by the frustration procedure.

Three types of response were recorded: striking the doll, striking the dog, striking the doll with the dog. Since the latter two types of response were infrequent, reliability of recording was assessed only on the basis of the total number of hits. The correlation between the frequencies of hitting responses, as recorded by the two observers, was .98.

It was assumed that striking the doll (representing a human being) was a more direct form of aggression than striking the dog, and the proportion of hits at the dog was taken as an index of the indirectness of *S*'s aggression. Striking the doll with the dog was a very infrequent response and was not separately considered in the analysis of results.

Results

The total number of hits made by each *S* and the latency of *S*'s first response were used to test hypotheses 1 and 3. The percentage of responses given by each *S* to the dog was calculated in order to test hypotheses 2 and 4. Since the data evidently did not permit the use of a parametric analysis, the Mann-Whitney U test was employed to test the significance of differences.

TABLE 1

AGGRESSIVE RESPONSES OF BOYS AND GIRLS, IGNORING GUILT LEVELS AND FRUSTRATION LEVELS
($N = 12$ in each group)

	Sums of Ranks			
	Boys	Girls	U	p
Total responses	191	109	31	$< .01$
Latency of first response	130	170	52	$> .10$
Proportion of responses to dog	143.5	156.5	65.5	$> .10$

As Table 1 indicates, boys gave significantly more hits than girls. There were, however, no differences between the sexes either in latency or in the proportion of responses to the dog. Because differences under the experimental conditions tended to be in one direction for boys and the other for girls, hypotheses 1 and 3 were tested for boys and girls separately. Since a nonparametric analysis was considered appropriate, no tests of possibly significant interactions were possible.

High-guilt and low-guilt *Ss* were first compared without reference to the level of frustration. High-guilt boys tended to take longer than low-guilt boys to make their first aggressive response ($p < .07$), but there were no other results that supported hypothesis 1 (Table 2).

The effects of high and low frustration were next compared without reference to the guilt levels of *Ss* (Table 3). Males under low frustration tended to give more aggressive responses and a shorter latency time than males under high frustration. These differences would have been significant had predictions been made in the opposite direction. The only finding that gave any support to hypothesis 3 was that girls under low frustration tended

TABLE 2

AGGRESSIVE RESPONSES OF SUBJECTS HIGH AND LOW IN GUILT, IGNORING LEVEL OF FRUSTRATION
($N = 6$ in each group)

	Boys (sums of ranks)				Girls (sums of ranks)			
	High-Guilt	Low-Guilt	U	p	High-Guilt	Low-Guilt	U	p*
Total responses	34	44	13	$> .10$	41	37	16	—
Latency of first response	49	29	8	$< .07$	33.5	44.5	12.5	—

* Differences in opposite direction from that predicted.

TABLE 3

AGGRESSIVE RESPONSES OF SUBJECTS UNDER CONDITION OF HIGH AND LOW FRUSTRATION, IGNORING GUILT LEVEL

($N = 6$ in each group)

	Boys (sums of ranks)				Girls (sums of ranks)			
	High Frustration	Low Frustration	U	p*	High Frustration	Low Frustration	U	p
Total responses	28	50	7	—	46	32	11	$> .10$
Latency of first response	52	26	5	—	29.5	48.5	8.5	$< .08$

* Differences in opposite direction from that predicted.

to take longer to make their initial responses than girls under high frustration ($p = .08$).

Results for boys and girls were pooled for testing hypotheses 2 and 4. Although high-guilt *Ss* tended to give a higher proportion of their total responses to the dog than did low-guilt *Ss*, the difference failed to reach significance (Table 4).

Ss under conditions of high frustration gave a higher proportion of responses to the dog than *Ss* under conditions of low frustration. The difference was in the opposite direction from that predicted (Table 4).

Rank order correlations between measures used in this study were calculated for boys and girls separately. The two measures of strength of aggression, total hits and latency of the first response, correlated $-.60$ for boys and $-.76$ for girls. Other correlations, including those between guilt scores and aggression measures, were small and evidently nonsignificant.

TABLE 4

PROPORTION OF RESPONSES TO DOG

($N = 12$ in each group)

High-Guilt vs. Low-Guilt *Ss*				High-Frustration vs. Low-Frustration			
SUMS OF RANKS				SUMS OF RANKS			
High-Guilt *Ss*	Low-Guilt *Ss*	U	p	High Frustration	Low Frustration	U	p*
165.5	134.5	56.5	$> .10$	178.0	122.0	44	—

* Difference in opposite direction from that predicted.

Discussion

The experiment provided relatively little confirmation of the theories upon which it was based. There were no consistent findings in the direction predicted by the hypotheses.

Failure to confirm hypotheses may be due in part to the choice of the measure of aggression. Hitting a toy has customarily been considered as an index of aggression, for example, in doll play experiments and in play therapy sessions. To regard this kind of response as aggression in the same sense as inflicting injury or hurt on a person may, however, be sometimes unjustified. When a child damages a toy in a real-life situation, his behavior may have a quite different significance; in this case, his act may upset his parents or other persons in his environment and thus indirectly cause them distress. In the experimental setting, however, it is usually made quite clear to the child that hitting is a permissible response. Under such circumstances, a child may strike playfully and without anger, especially when a punch-bag type of toy is employed.

A somewhat similar criticism may be made of the measure of anxiety and guilt used in this study. The assumption that a child's responses to pictures will faithfully reflect his responses in real-life situations may not be justified. A better measure would perhaps be obtained if each child were exposed to a temptation situation. The time that elapses before he deviates could then be taken as an index of anxiety and guilt.

It was assumed in this study that taking away a preferred reward provided greater frustration than taking away a nonpreferred reward. Since there was no confirmation of the hypotheses relating to frustration, this assumption must be questioned. The only evidence supporting it was the apparently greater discomfort of the children who lost lollipops.

The greater incidence of hitting responses among boys is not surprising. The punchbag is predominantly a masculine plaything, and by the age of five years most children have experienced a good deal of sex typing at the hands of parents and others. The apparent (though untestable) interaction effects involving sex and other variables cannot, however, be explained within the theoretical framework of this study.

Summary

Twelve high-guilt *Ss* and 12 low-guilt *Ss* were identified by means of a projective test. Half the high-guilt *Ss* and half the low-guilt *Ss* were then subjected to a high-frustration situation. The remaining *Ss* were assigned to a low-frustration situation. The subgroups were balanced in respect to both sex and age. Following frustration, each *S* was provided an opportunity of displaying aggression by striking either an inflated rubber punch-bag (in the form of a child of indeterminate sex) or a toy dog. The total number of times *S* struck either toy and the latency of his initial response

were taken as measures of strength of aggression. The proportion of responses given to the dog served as an index of the extent to which *S* displaced aggression.

Hypotheses that the guilt-level of *Ss* and the degree of frustration would have significant effects on the amount of aggression manifested, on the latency of the initial aggressive response, and on the incidence of displaced responses were not confirmed. This failure to confirm predictions suggests that some of the assumptions underlying this experiment (and others of the same general kind) may not be justified.

References

1. Bandura, A., & Walters, R. H. *Adolescent aggression.* New York: Ronald Press, 1959.
2. Brown, J. S., & Farber, I. E. Emotions conceptualized as intervening variables, with suggestions toward a theory of frustration. *Psychol. Bull.,* 1951, 48, 465-495.
3. Dollard, J., Doob, L. W., Miller, N. E., Mowrer, O. H., & Sears, R. R. *Frustration and aggression.* New Haven: Yale Univer. Press, 1939.
4. Heinicke, C. M. Some antecedents and correlates of guilt and fear in young boys. Unpublished doctoral dissertation, Harvard Univer., 1953.
5. Lawson, R., & Marx, M. H. Frustration: theory and experiment. *Genet. Psychol. Monogr.,* 1958, 57, 393-464.
6. Miller, N. E. Theory and experiment relating psychoanalytic displacement to stimulus-response generalization. *J. abnorm. soc. Psychol.,* 1948, 43, 155-178.
7. Sears, R. R., Maccoby, Eleanor E., & Levin, H. *Patterns of child rearing.* Evanston: Row Peterson, 1957.
8. Sears, R. R., Whiting, J. W. M., Nowlis, V., & Sears, Pauline S. Some child-rearing antecedents of aggression and dependency in young children. *Genet. Psychol. Monogr.,* 1953, 47, 135-234.
9. Siegel, S. *Nonparametric statistics for the behavioral sciences.* New York: McGraw-Hill, 1956.
10. Whiting, J. W. M., & Child, I. L. *Child training and personality.* New Haven: Yale Univer. Press, 1953.

EFFECTS OF MATERNAL EMPLOYMENT ON CHILDREN: EVIDENCE FROM RESEARCH[1]

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Social concern for the children of mothers who work outside of their homes has had a long history. It began with the industrial revolution in England and Europe when the invention of machines outmoded home industries and forced not only men but their wives and children into factories and mills for their pittance living. The problems of the latter part of the eighteenth century and of the nineteenth century were the problems of the "poor working class." Mortality statistics indicated that the babies of factory women died in alarming numbers. There was evidence too of increasing juvenile crime developing in the overcrowded new industrial centers (15, p. 41).

Mixed motives instigated the zeal of philanthropists to do something about the deplorable state of infants and children, left without care while the mother worked long hours away from home. There were those who wished to keep the working class alive because industry needed them and

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to decrease crime because of the social expense, but at the same time they wished not to educate the children of working people beyond their station in life. Others, like Robert Owen, saw in the pressing needs of children for care outside the home an opportunity through education to develop a new social order. Less ambitious but warmhearted philanthropists aimed to provide some kind of care which would be a substitute for that which the working mother could not give. Inquiring minds bent their energies to exploring various ways in which the needs of children might be met. In England, infant schools developed; in France, the écoles à tricoter of Oberlin, the salle d'hospitalité of Mme. de Pastoret, and the salle d'asile of the philanthropic lawyer Cochin; in Italy, the infant schools of Aporti; in Belgium the écoles-gardiennes (15, pp. 40-82).

In our own country the problem of the working mother and her children came later, as industrial activity slowly permeated the American culture in the second half of the nineteenth century. The first day nursery was opened in New York City in 1854; however, it was not until well into the twentieth century that nurseries developed in any great numbers. By that time the nurseries were serving mainly working mothers who were without husbands due to death, divorce, or desertion. The provisions of mothers' pensions which spread over the country after 1911 decreased gradually the demand for care of fatherless children whose mothers worked (3).

Between 1910 and 1925 there were a number of studies of employed mothers and of their children made by economists and social workers describing (a) the number of married women workers and the kinds of occupations they were engaged in, (b) the conditions of the working mothers' families especially in regard to income and to housing, and (c) the substitute care provided for their children. There were also analyses of mortality statistics showing that the likelihood of death during the first year of life was higher if the mother worked outside the home. These were data needed by social workers in order to press for such social reforms as increased wages, mothers' pensions, and improved housing (15, pp. 257-262).

By the 1930's social opinion in the United States concerning mothers working outside the home had pretty well jelled: no mother should work outside the home unless she *had to* because of economic need, but even then welfare workers should do all they could to help her meet the economic need without outside work. This opinion was strong and widespread in spite of the fact that the numbers of employed women had gradually been increasing since 1900 and their occupations were becoming more varied.

During the depression thirties, the first studies appeared which attempted to investigate the characteristics of children of employed mothers as contrasted with a group of children of unemployed mothers (14, 31). The study which we undertook in the mid-thirties at The Family Consultation Bureau of the Child Development Institute of Columbia University (14) is interesting because it foreshadows some of the more recent studies. Fifty families

of employed college women were compared with 50 families of nonemployed college women on a number of items elicited through intensive interviews. All women had at least two years of college, were under 45 years of age, and had at least one child under 10 years. Although the statistical data were never published, some general findings are worth noting. The employed women, as compared with the unemployed, came from families with lower incomes, but there were also women who worked because they were restless and bored at home, and there were others who might be termed "career women." There was no difference between the groups in health status, in marital, sexual, and emotional adjustment, and in number and seriousness of child problems, although the unemployed women had more children. The problems of children in both groups were judged to be more highly related to the mother's emotional adjustment than to her occupational status.

With the advent of the second World War the concern for the children of working mothers gained momentum. Surveys showed the increasing migration of families to war industry centers, the crowded housing conditions, the rise in the number of women working outside the home, the decreasing number of boarding homes, and the inadequate number of nursery schools (48, p. 2). The war emergency called for action, not research, and ameliorative measures were put into full swing by social workers and educators.

Since the end of the war, however, increasing numbers of women have been entering the labor force, and the new conditions seem to be a permanent change in social life rather than an emergency adjustment. According to census figures in 1959, women comprised almost one-third of the labor force and these 23.5 million women were working in every occupation listed in the United States Census. Sixty per cent of the working women were married and, of these, seven out of eight were living with their husbands. In 1957 almost a third (30 per cent) of women with children under 18 years of age were working, 7.5 million women. There was an approximate increase of 80 per cent from 1948 to 1958. Participation roles of women in the labor force vary considerably with the age of children in the home: For example, in 1955 only 15 per cent of married women worked whose husbands were present and whose children were all under six; but 25 per cent of such women worked if they had children 12 to 17 years old, as well as children under six; and 37 per cent worked if all their children were 12 to 17 years old. In general, about 20 per cent of all mothers with children under six (about 3 million women) work and about 40 per cent of those with children 6 to 17 years of age (about 4.4 million women) (8, p. 188; 28, pp. 12-14; 34, p. 132).

The present situation has stimulated many articles in magazines and newspapers, elaborating sometimes with great emotion on the evils of women working. A well-known sociologist in a book published in 1948 (5, pp. 380-383) discusses the employment of mothers in a chapter on "fam-

iles under stress." He enumerates seven items which he considers obvious costs to children of their mothers working outside the home. These briefly are: (a) mothers are unduly tired, impatient, and irritable; (b) children are lonely when mothers are tired and busy; (c) children feel, and are, neglected; (d) children run riot without supervision; (e) mothers cannot share school experiences with children; (f) mothers cannot do the mending and the other services children need; (g) mothers cannot teach children socially approved behavior. These conclusions are presented without factual documentation.

However, there has been an increase in the number of research studies which have attempted to tease out from the many variables which influence children's development what, if any, weight should be given to the factor of maternal employment. This is a difficult task. The studies in general are of two types: (a) those that investigate changes in the structure and function of the family due to maternal employment and (b) those that investigate the effects of maternal employment on children. A few have attempted to study the sequence: maternal employment brings about changes in the family structure and/or function which in turn brings about changes in children.

We give only two examples of studies in the first classification. The first is a recent investigation by Hoffman (26) of the effects of maternal employment on household tasks and parental power relations. In a carefully controlled study of 89 working and 89 nonworking mothers of children in third through sixth grade, the author has found several family conditions which are related significantly to maternal employment: Working mothers participate less in household tasks and their husbands participate more; they have less control over the activities in the household; they are less likely to endorse the traditional sex role ideology than the mothers who stay at home. The husband's participation in household tasks is highest when the wife is employed and when the ideology is nontraditional. An attempt to relate an increase in the wife's power over the husband with outside employment did not show clear-cut results. Power was defined as the extent to which one parent decides over the other parent's behavior. The data regarding husband and wife activities and control within the home were obtained from the answers of children to questions concerning which family members *do* a series of routine household activities and which *decide* about the activities. For example, the child was asked "Who cooks the evening meal?" and "Who decides what to cook for the evening meal?" It is questionable whether children of third through sixth grade know, in many instances, which of their parents make such decisions or know the unrevealed source of power which may make a mother decide on potatoes for dinner because her husband detests rice. The author argues that, even if the child does not report correctly for a particular act, the over-all responses to the total set of questions is a reflection of his general picture of the power relationship between parents. This may be so, but at best it is

only a child's perception of the complex power relation between husband and wife.

An unusually comprehensive study of factors related to maternal employment has been made by Nye (35, 37, 38). From questionnaires returned by over 2000 mothers of children in grades 1 and 10, the author has analyzed a number of differences between families with maternal employment and those with maternal nonemployment. Employed mothers were found to have fewer preschool children, smaller families, higher education, and husbands in lower socioeconomic categories. These demographic variables were controlled in subsamples for comparison on other items. The employed mothers had different recreational patterns than the unemployed mothers with less visiting, telephoning, playing cards, partying, and watching television. A significantly larger percentage of employed mothers reported arguments and quarreling in the family, indicated they had lived apart from their husbands, and had considered divorce. However, the percentages of mothers reporting arguments was not large (8.2 per cent in one category; 14.9 per cent in another), and there were only 16.7 per cent who had lived apart. On the other hand, 60.1 per cent had considered divorce. This figure is less dramatic when one notes that 46.6 per cent of the nonemployed mothers had considered divorce. Nye also had data on the adjustment of these two groups of mothers to children. Of five items considered indicative of satisfactory adjustment to children, only one showed a significant difference between employed and nonemployed mothers: the unemployed mothers desired more children (groups were matched for family size). Of the five items intended to indicate unfavorable attitudes toward children, only one showed significant differences between the two groups: more unemployed mothers stated that "children make me nervous." A quasi-scale, composed of items from the favorable and unfavorable items, yielded no significant differences between the groups, but the differences were in the direction of more favorable attitudes of employed mothers.

Some interesting alterations of these general findings were revealed by subsampling. In small families, employed mothers are more likely to be well-adjusted to children than nonemployed mothers, but the reverse is true in families with four or more children. Differences in the length of time the mother had been employed failed to show any significant relation to adjustment to children, but the pattern indicated that adjustment to children becomes better as the mother works longer (up to four years, the maximum recorded). The author states, "If the sample indicates a pattern in the population, it is that employment initially produces poorer adjustment to children, probably related to role conflicts. As behavior becomes more congruent and as family expectations are modified, these conflicts are presumably decreased" (38).

For the most part, we have not included studies dealing with family structure or function in this review because we are primarily interested in the effect of maternal employment on children. One can assume that any

changes which the fact of maternal employment brings about in family structure and the functioning of its members will affect in some way the behavior and the development of the child. But, unless the investigator takes the next step and studies the effect on the child, we have not reviewed the report. We have attempted to find what published research (and a few about-to-be published studies) can contribute to our understanding of the effects of maternal employment on (a) delinquency, (b) adjustment of adolescents, (c) adjustment of elementary school children, (d) achievement of children in school, (e) development and adjustment of preschool children, (f) infant development, (g) perceptions and attitudes of children.

General Background of Employed Mothers

Studies have shown that, on the whole, mothers who work in comparison with mothers who do not work have higher education, are in lower socioeconomic categories on the basis of husband's occupation and income, include a higher proportion of widowed, divorced, or separated women, have smaller families, and more of them have urban residence (34, 36, 45, 49). Most of the early studies of the effect of maternal employment on children, as will be seen in the review, made no attempt to control these variables and in some cases had no control group of nonworking mothers. Studies during the past decade have nearly all attempted to control either by selection or matching some, if not all, of these pertinent variables.

Delinquency

It is frequently stated that a child is more likely to become delinquent if the mother is employed than if she stays at home. One argument on which this conviction is based runs something like this: If the mother works, her child will not be adequately supervised; therefore he will have opportunity to taste the delights of doing what he is not supposed to do and thus become a delinquent. Another argument emphasizes neglect: If the mother works, her child will feel neglected, become hostile towards the parent, and unconsciously get back at her by doing what she does not approve of. A third one points to the father: If the mother works, the father will become the disciplinarian and, since his discipline will be harsher than the mother's, resentment and hostility will lead the child to delinquent acts.

Let us see what research has uncovered about this knotty problem. Hodgkiss, in 1933 (25), matched 362 delinquent girls in Chicago for age, nationality or race, and residence-neighborhood with an equal number of nondelinquent school girls. She found that the mothers of 38 per cent of the delinquent girls as compared with 29 per cent of the nondelinquents worked. However, 67 per cent of the delinquents as contrasted with 45 per cent of the nondelinquents came from broken homes. When the variable

of broken homes was held constant, the difference in delinquency among daughters of working and nonworking mothers largely disappeared.

Spurred by concern about the increasing number of mothers who are entering employment and the somewhat widespread belief that this condition influences the amount of juvenile delinquency, Sheldon and Eleanor Glueck went back to previously published research to review what they had found about the relation of employment of mothers to delinquency of offspring. In their follow-up of 500 graduates of a women's reformatory in Massachusetts (17), they found that over half of the mothers of the delinquent women had worked at least occasionally as compared with 11.6 per cent of married women in Massachusetts at a comparable period. In a study of one thousand juvenile delinquents (18), 41.5 per cent of the mothers worked in comparison with a general statistic of 9.9 per cent of married women. These comparisons between the percentage of delinquent children who had employed mothers and the percentage of employed married women in the state cannot be taken at face value. Studies have shown that delinquency is highly related to low socioeconomic status. Therefore, the percentage of working mothers of delinquents should be compared with the percentage of working mothers in the state in similar socioeconomic class. If economic status had thus been controlled, it is likely that the results would be less prejudicial to the working mother.

The Gluecks then went back to data collected before World War II (field work began in 1939) for a study of the causes of juvenile delinquency and reanalyzed their material on the basis of employed mothers versus nonemployed mothers (19). The subjects were 500 delinquent boys matched pair by pair with 500 "true" nondelinquents for ethnico-racial derivation, age, and general intelligence. All families lived in culturally underprivileged, urban areas. The employed mothers were engaged in cleaning and scrubbing, domestic service, factory work, and other jobs of similar status level. They were divided into two groups, those regularly employed and those occasionally or sporadically employed.

Of the delinquent boys, 53 per cent had mothers who were housewives and 46.4 per cent had mothers who worked. There was no difference in the proportion of delinquent and nondelinquent boys who had mothers who were regularly employed, but a greater proportion of delinquents than nondelinquents had mothers who worked irregularly.

The mothers who worked sporadically and had delinquent sons were a sad and unfortunate lot. In comparison with the housewives, significantly more of them had husbands who were emotionally disturbed and whose work habits were not good; more of these families were financially dependent on social aid. In comparison with both the housewives and the regularly employed mothers, a significantly higher proportion of these irregularly-employed mothers of delinquent sons had themselves been juvenile delinquents. More of the parents in these families than in the families where the mother worked regularly were lacking in self-respect. Significantly more

of the delinquent sons of these sporadic workers had emotional conflicts than the sons of the regularly employed, and there were significantly more truants at 10 years or younger among the delinquent sons of the sporadic workers than of either the regular workers or housewives.

The authors suggest that the irregular worker is a woman of a different "breed," motivated to work "not so much to supplement family income as by the urge to escape household routines and maternal responsibilities" (19, p. 335). They infer that the sporadic work of the mothers is an added pressure to delinquency on their conflict-burdened sons. Eleanor Maccoby, in discussing these findings (29), questions whether the sporadic employment of the mother as such was conducive to delinquency in the sons and suggests rather that the basic cause both of sporadic employment and son's delinquency lay in the emotionally disturbed and antisocial characteristics of the parents.

The Glueck study also shows the importance of adequate supervision. In a table arranged by Maccoby (29) from the Glueck data, it can be seen clearly that housewives who did not supervise their boys adequately had a high percentage of delinquent children, as large a percentage as the mothers who worked. Although overstrict discipline on the part of fathers of nondelinquents was more prevalent in the families where the mother worked, among the families of delinquent boys this kind of treatment was prevalent whether the mother worked or not.

Nye (36), in a questionnaire study of some 2000 children in grades 9 through 12, reports that the responses of the children to a Guttman-type scale indicate that there are significantly more delinquent children in intact families in which the mother is employed than in intact families in which the mother is at home. The criterion for delinquency is not "being apprehended by the law" but is the admission by the child on the questionnaire that he has engaged in such acts as pretty theft, truancy, ungovernability, vandalism, driving without a license, and alcoholic and sexual offenses. The differences between the two groups decreased (though the direction of the differences remained the same) when size of family, socioeconomic status, urban-rural residence, and sex of the adolescent were controlled by subsampling.

When a separate analysis was made of children from broken homes, the differences between children of employed and nonemployed mothers were nonsignificant. This is similar to Hodgkiss' findings for girls (25). Glueck and Glueck (19) reported that there were significantly more broken homes among the employed mothers than among the housewives, but this factor was not controlled in the analysis. No significant difference was found by Nye between children of part-time and full-time employed mothers.

It is impossible to compare Nye's finding with the two previous studies not only because of the different criteria for defining delinquency but also because Nye did not differentiate between regular and sporadic workers as was done by Glueck and Glueck.

Although the investigation was not primarily focused on employed mothers, Bandura and Walters (2, p. 13) report that in the 52 middle class families studied the delinquent boys group had fewer employed mothers (nine out of 26) than the control group of nondelinquent boys (12 out of 26) though the differences were not statistically significant.

General Adjustment of Adolescents

On the whole, the studies reviewed tend to deny the contention that children of working mothers are more likely to be delinquent than children of mothers who remain at home, but what about the general adjustment of adolescents? Does maternal employment affect the emotional adjustment of adolescents?

Nye (36), in the study of adolescents reported above, using a Guttman-type scale developed to measure psychosomatic symptoms, found no difference in anxiety of this type in children of working and nonworking mothers of intact families. Glueck and Glueck (19) found emotional conflict significantly more prevalent in delinquent boys whose mothers worked sporadically than in delinquent boys whose mothers worked regularly; and hostility (as evidenced on the Rorschach) among nondelinquents was significantly higher in boys whose mothers were sporadic workers than in sons of housewives. The Gluecks also found more boys with defensive attitudes among nondelinquent sons of regular employed mothers than of housewives.

For adolescent boys, then, evidence shows no difference in the adjustment of sons of employed and nonemployed mothers, except a tendency for nondelinquent boys of employed mothers to be more defensive. The sons of irregularly employed mothers show greater emotional conflict if delinquent and greater hostility if nondelinquent.

We found only one study of adolescent girls. Essig and Morgan (11) made a study of girls in ninth and tenth grade home economics classes in 11 communities using Stott's Home Life scale of adjustment to determine the difference in adjustment of adolescent girls of employed versus unemployed mothers. Matching of 151 girls of employed mothers in intact families with a similar number of girls from intact families in which mothers were not employed was by community of residence only. Although the girls in both groups varied in age from 13 to 18 years (76 per cent 14 and 15 years old), there was no paired matching for age. Variables, such as socioeconomic class (except as this may be indicated by residence), number of children in family, and educational level of mother, which Nye (36) has found are significantly related to maternal employment, were not controlled.

All employed mothers were full-time workers (no definition given), three-fourths of whom had worked two or more years. Sporadic workers of the type studied by Glueck and Glueck (19) were not included. Most of the women were day workers but 6 per cent worked at night and 9.3

per cent worked both day and night. According to the daughters' reports, 50 per cent of the working mothers, contrasted with 2 per cent of the nonworking mothers, were rarely at home when their daughters came home from school. This indicates less supervision of the adolescent girls by working mothers, but substitute care was not reported and the quality of the supervision of either group of mothers was not evaluated.

The over-all mean adjustment scores showed the daughters of working mothers to be less well adjusted than the girls of nonworking mothers. Forty-nine of the working mothers' daughters, contrasted with nine of the nonworking mothers' daughters, had scores in the maladjusted range. Responses indicated that a greater percentage of daughters of working mothers than daughters of nonworking mothers felt that (a) their parents did not approve of their behavior, (b) there was a lack of communication between parents and daughter, (c) home life was not happy, and (d) their fathers rejected them and they disapproved of their fathers.

These findings might be more convincing if there had been more precise matching of groups and therefore more control of relevant variables. Maccoby (29) makes a critical comment on the findings relative to the feelings and attitude toward the father which were found in this study:

> Curiously enough the girls with working mothers seemed to have more disturbance in their relationship with their fathers than with their mothers. Possibly the mother's working in some way weakens the father's role in the family so that the daughter does not respect him as much as she might otherwise. An equally possible explanation, however, is that a number of the mothers are working because their husbands are unstable, a quality which might produce negative feelings toward a man on the part of both wife and daughter. Until we can compare families which are initially similar in paternal stability and economic level, we will not know the effect of the mother's working per se on adolescents' adjustment (p. 84).

Adjustment of Elementary School Children

A study was made during the war in Leicester, England, a town which had almost no bombing, to try to determine the incidence of emotional symptoms in school children (7). Nineteen teachers in three schools appraised a total of 239 children, between the ages of two and seven years, for some 46 symptoms such as restlessness, concentration, frequency of visits to lavatory, laziness, etc. No details are given as to method of appraisal or recording. The author states that there was some evidence that the children of working mothers were more antisocial since they were more frequently described as aggressive, cruel, and lying than were children with mothers who did not work. The children of working mothers were not matched on relevant demographic variables with children of nonworking mothers. In addition, it is possible that the teachers who rated the children knew

the work status of the mothers, and, if so, the ratings cannot be considered objective.

A brief report has been published by Hand (21) of the adjustment of 102 children in grades 4 through 8. The children were divided into two equal groups of "well-adjusted" and "maladjusted" on the basis of their responses on the California Test of Personality, ratings by teachers, and choices by classmates. In each group were 27 boys and 24 girls. On the basis of information obtained from each child regarding whether his mother was presently employed outside the home, the percentage of children with working mothers was reported for the "adjusted" and "maladjusted" groups. The over-all percentage for both groups was the same (31.4 per cent), with a slightly higher percentage of girls and lower percentage of boys in the well-adjusted group having working mothers and a higher percentage of boys and lower percentage of girls in the "maladjusted" group having working mothers. However, these differences were not statistically significant. These results cannot be considered seriously because of the source of the data regarding maternal employment and the absence of discrimination between maternal employment which was full-time, part-time, or irregular.

Rouman approached the study of this problem from a different angle (41). He was concerned with contemporary social conditions which he believes jeopardize the mental health of children, including employment of mothers and divorces creating stepparents and guardians or the absence of an adult male in the home. From a school population of 16,000 pupils, 400 of the more serious cases under supervision of the guidance staff were selected in order to study the relationship of parental care to children's problems. (Physically handicapped and mentally retarded children were excluded.) The cases were divided into four "parental care" groups: full-time employed mother (18 per cent), stepparents or guardians (16 per cent, absence of adult male (12 per cent), intact families where mother did not work (18 per cent). This latter group had none of the characteristics of the first three groups and was selected at random from the remaining cases to serve, as the author states, as a control group. The group of children who had mothers who were employed full-time, we assume, came from intact families. If this assumption is correct, it means that, of the 400 seriously disturbed children, 288 children (72 per cent) were from intact families, of which only 72 children had full-time employed mothers. The author states that "Apparently, there are many children whose mothers work, who do not present problems in school" (41, p. 111). However, since he does not present figures regarding the percentage of school population with full-time working mothers, we have no base line upon which to judge whether the 18 per cent of cases with full-time employed mothers is more or less than the statistical expectancy for that group.

Rouman compares the four "parental care" groups on the basis of four items: major reason for referral of child to the guidance service, age of

child, order of birth of child, and personality components. For our purposes, the most relevant comparisons are those between group I (the full-time employed mother group) and group IV (the control group, who, we assume, are intact families with nonemployed mothers). The main differences in the reasons for referral to the guidance staff lie in "academic failure" in which the employed mothers' group had 28 per cent in contrast to 40 per cent in the control group and in "withdrawing behavior" in which the employed mothers' group had 33 per cent in contrast to 20 per cent in the control group. The differences in the age of the children were slight, but there was a tendency for slightly more of the employed mothers' children to be younger and older. The greatest difference was in the age level 9 to 12 years, in which the employed mothers had 30 per cent of their cases and the control group 40 per cent. Regarding order of birth, there was a stronger tendency for children of working mothers to be the youngest in the family (36 versus 22 per cent) and an only child (22 versus 5 per cent). The children of the control group tended to be either the middle child (1 per cent employed mothers' group, 13 per cent control group) or the oldest child (26 per cent employed mothers' group, 47 per cent control group).

In estimating the personality components of the children, Rouman used the California Test of Personality and reported only the percentage of each group which fell below the fiftieth percentile. On three characteristics, approximately the same percentage of children in both groups fell below the fiftieth percentile: feeling of belonging, family relations, and school relations (including relations with teacher, relations with peers, and adaptation to school work). The contrasts lay in other areas. More of the children of employed mothers lacked self-reliance (50 versus 0 per cent below the fiftieth percentile), and more were withdrawing (68 versus 0 per cent). Whereas there were no children of employed mothers below the fiftieth percentile in the following components, the control group lacked social skills (60 per cent), lacked a sense of personal worth (61 per cent), and had antisocial tendencies (61 per cent). There is grave question about the meaning of this part of Rouman's study, for, although he found differences between the group of employed mothers' children and the control group in age and in birth order, he did not match the children on these factors when comparing the groups on reasons for referral and on personality components. In addition, he took no account of socioeconomic status of the families in the two groups.

From a recent unpublished study of 60 deviant children in grades 1 through 4, we have some slight evidence in regard to working mothers (1). Bandura selected, by means of teacher ratings and behavioral observations, 30 children who were extremely aggressive and 30 who were extremely inhibited in behavior exhibited at school (in classroom and on playground). At the time the study was made, 10 mothers of the aggressive children and seven mothers of the inhibited children were employed full time, a total of 28 per cent of the sample. Since the national average of working mothers

of school children is about 40 per cent, we might assume conservatively that the working mothers in this community were not contributing more than their statistical share of the extreme emotional problems of aggression and inhibition in children.

Hitchcock (24) found that 14 pairs of boys of working and nonworking mothers in grades 3 through 6 showed no significant differences in dependency-independency behavior as observed in the classroom. These results came from a study patterned after the study of Siegel, Stolz, Hitchcock, and Adamson (45), which is discussed in more detail under the section on preschool children.

Achievement in School

The impression held by some teachers that children of working mothers do less well in school work is not supported by Nye's findings regarding children in grades 9 through 12, in the study previously reported (36). There was no significant relationship between maternal employment (when socioeconomic status, family size, educational level of mother, rural-urban residence, and sex were controlled) and educational competence as indicated by grade average. When analysis was limited to children of full-time working mothers versus nonworking mothers, the results showed a higher grade point average in children of the employed mothers though the difference was not statistically significant.

Hoffman (27), on the other hand, in a recent study to be described more fully in a later section of this article, found that white children (in third through sixth grade) of working mothers in intact families had lower intellectual performance as rated by teachers than a matched group of children whose mothers did not work. It is possible that we may have here only a reflection of the teacher's prejudice if the teachers knew about the home background of their students when they rated them, as we might assume elementary school teachers would.

Hitchcock (24), in the study mentioned before, did not find statistically significant differences in IQs or achievement test scores in reading and arithmetic for sons of working and nonworking mothers (grades 3 through 6). The largest mean difference was in reading with the sons of working mothers scoring higher.

The only other data we could find on this very important aspect of maternal employment is a statement by Nevitt Sanford concerning the intellectual accomplishment of Vassar College students (42). As part of a comprehensive study of college education, an attempt was made to find out what distinguished good students from poor students. Sanford reports "the most important factor among good students was that their mothers had intellectual interests and aspirations. Their fathers either had similar interests, or, at the least, did not disapprove of intellectual women. In the best cases of all, the mothers had performed or were performing some activity that required a high level of education" (p. 198).

Development and Adjustment of Preschool Children

Psychological theorists as well as those who have had experience as practitioners of social work, pediatrics, psychology, or psychiatry are likely to emphasize the detrimental effects which maternal employment may visit upon young children. It is assumed that the separation of a young child from his mother when she goes to work increases the level of anxiety of the child and prevents access to her as an identification figure. Both of these psychological conditions would be expected to affect the personality of the child adversely. In addition, during the preschool years when socialization and the development of conscience is an important aspect of childrearing, the mother's absence might interfere not only with the acquisition of socially acceptable behavior but also with the development of internal controls which we call conscience and guilt (43, Chap. X).

It is evident that with preschool children an intervening psychological condition, i.e., the kind of substitute care which the mother provides in her absence, becomes an important variable influencing behavior. A study made in London during the last war sheds some light on this (16). Forty-eight children of working mothers, who had attended a day nursery for at least one year, were matched for age, sex, and size of family with a similar number of children at home whose mothers did not work. There were no broken homes or illegitimacy in either group but in the working group 33 fathers were away in the armed forces and in the nonworking group 14 fathers were away. Data concerning eating, sleeping, and elimination habits were secured through interviews with mothers, teachers, and nurses. There were no significant differences between the nursery and home group in eating or elimination problems. In sleeping habits, however, 18 nursery against 11 home children showed disturbances. Combining difficulties in all three areas resulted in 29 home children against 33 nursery children having difficulties, which difference was not statistically significant. There were more "problem" children among the nursery group (17 versus 10), i.e., children with more than one severe habit problem or with marked personality difficulties. The author also investigated home environmental factors such as standards of child care, personality of mother, marital discord, and unsatisfactory discipline. From her nonstatistical analysis the author concludes that differences in behavior and personality were more closely related to these environmental factors than to home care versus nursery care. She states that mothers who had difficult personalities and whose attitudes toward their children was unsatisfactory were more numerous in the nursery group than the home group and might account for the differences found between the two groups of children.

We have here an indication again of the need of somehow controlling the variable of mothers' personality and attitude toward children before we can evaluate to what extent or in what ways maternal employment

affects children. This study confuses the issue of the relation of maternal employment and child behavior because the nonemployed mothers' children were at home. It also confuses the issue regarding nursery care versus home care because of the difference in employment status of mothers.

Heinicke (23) has also studied, through observations and doll-play, a small number (seven) of children of working mothers attending a Day nursery compared with six children who were temporarily separated from their parents and living in Residential nurseries. The children in the two groups were of similar sex and age (16 to 27 months), were from intact families of similar socioeconomic status, and had no sibling in the nursery. There were no obvious differences in preseparation experiences related to acceptance-rejection by parents, and no child had previously been separated from his parents for more than three days. Data were collected during the first 19 days of attendance at the nursery. The general atmosphere and routine of the nurseries was reported as similar, with opportunities for each child to form an attachment to the nurses and to the children in his group. In the Day nursery, children were brought by a parent in the morning and were called for about five in the afternoon; in the Resident nurseries, children remained during the whole period of their stay but might be visited by fathers, when the mother was in confinement.

The author was interested in how the two-year-old relates to human beings in a nursery when separated from his parents and in whether the degree of separation affected the responses of the child. It was found that the two groups did not differ significantly on the first two days; however, after the Residential children had been away from their parents more than one night, strong differences began to emerge. In many of the areas of behavior analyzed, the Residential children showed behavior which was more disturbed: they sought relations with adults in the nursery in a more intense manner, crying more frequently, and seeking affection rather than simply seeking to be near; but they also actively resisted the demands of the nurses more; they consistently did more thumb- and finger-sucking; they evidenced more breakdown in sphincter control; they more frequently developed colds. By far the most striking difference between the two groups was in relation to hostility, the Residential children expressing, not only more, but also a more intense form of hostility.

This exploratory study supported the author's hypothesis that more intensive separation leads to more pronounced imbalance. Heinicke states that he had the feeling that the Day nursery children too were struggling with the problems seen more clearly in the responses of the Residential children. However, it would seem from the results that the problems of the Day nursery were within the ability of the two-year-old to cope with. It seems reasonable to assume that under any conditions the two-year-old will face the necessity of coping with his mother's absence some of the time, so that the real question concerns how often, for how long, with what

degree of anxiety. Quite possibly, part of the prejudice against mothers working has stemmed from the reports of studies of children in Residential nurseries.

The question of maternal employment and its effect on preschool children has been part of a preliminary survey of children under stress conducted under the aegis of the Australian Preschool Association (6). Of 115 children three to five years of age, enrolled in preschool centers, 35 had employed mothers, 13 of them full-time. On the basis of records previously made by them, teachers judged that only six of the 35 children were under stress due to the mother's working. No analysis was presented of the factors which caused these six children to be disturbed while 29 children of working mothers were not disturbed.

Our own study of the effect of maternal employment on young children (45) was an exploratory investigation in which we attempted to do several things. *First,* we wanted to study young children because in general most concern is expressed about the effects of maternal employment on them. *Second,* we wanted to study children in school because from our experience many teachers believe that children whose mothers work do poorly in school and are overly dependent on the teacher for affection and guidance. *Third,* we wanted to control as many relevant variables as it was possible to do without losing all of our sample. The result was a study of 26 matched pairs of five-year-olds in kindergarten classes, 10 pairs of girls and 16 pairs of boys. Each child had been enrolled in the kindergarten for at least three months and was from a nonminority intact family with no siblings over 14 years of age. The working mother group was limited to children whose mothers worked at least 32 hours a week and had been so employed for the past six months. The nonworking group had mothers who had not worked during the life of the subject. The pairs of working mothers' and nonworking mothers' children were matched for sex, age within four months, occupation of father within one socioeconomic level, number of siblings, and ordinal position in family. In addition, each member of a pair had to be enrolled in the same kindergarten class. Data were collected through recorded observations made during the indoor activity period at kindergarten. Each subject was observed for four distributed 15-minute periods. Each child in a pair was observed on the same day. The observational records were divided into behavior units, then categorized into nine systems of behavior relevant to dependence and independence and a tenth residual category.

The results of this study revealed no differences between the children of working and the children of nonworking mothers for either the kindergarten boys or the kindergarten girls. Combining the data for the two sexes again failed to reveal that children of working mothers differed significantly on these characteristics from children of nonworking mothers. Boys could not be compared with girls, because data were collected by different observers. However, there was some indication that the implications of a

mother working may be different for a boy than for a girl, which may be related to the process of identification, but this is only a hunch for further investigation.

Certainly these four studies of young children do not settle the question but in general seem to point to three considerations: the need to control for personality of the mother or for mother-child relations (a most difficult task); the need to study the amount of separation from the mothering person which a young child can learn to cope with; the difference in effect on young boys and on young girls of the mother working. In any study of maternal employment and young children there is the additional requirement that some account be taken of the kind of substitute care provided.

Effect on Infants

There have been few recent studies of the effect of maternal employment on infants, perhaps because it is assumed that relatively few mothers with infants work. However, since recent statistics regarding maternal employment tend to group mothers with children under six and not to separate those with infants under 18 months or two years, we do not know precisely how many mothers go to work while they have babies. Psychological studies have focused on the effects of social isolation or lack of mothering on infant development (51), and from these studies professionals and others have drawn conclusions regarding the bad effects of maternal employment. The earliest studies of maternal employment and infancy used census data to relate infant mortality and employment of mother without controlling pertinent variables such as socioeconomic status. In Scotland, prior to 1914, an excess mortality of about 62 per cent was found for children of mothers who worked outside the home (9). In England, analysis of the 1911 Census (12) showed that working mothers, in comparison with nonworking mothers, had a lower birth rate and their children had a higher death rate. Child death rates were found to vary among working mothers on the basis of occupation, lower among higher level occupations.

A study made in Germany in 1931 by Teleky (52), based on 3,000 questionnaires, found infant mortality higher when the mother resumed work six weeks after birth than when she remained away from work for a longer period. Since we only had access to an abstract, we do not know which if any variables were controlled. One might assume, if economic variables were not controlled, that the mothers who went to work six weeks after the birth of a child did so because of economic compulsion and therefore other factors, such as malnutrition, lack of medical service, or inadequate substitute care, might combine to cause the increased infant mortality.

A more recent investigation was made in Glasgow in 1951-1952 (13) of 350 employed mothers and a similar number of mothers not employed, all selected from the Health Visitor's records. The groups were matched for socioeconomic background and place of residence. Each mother had

an infant seven months old, but the number of children in the family was not matched. It is reported that the mothers who worked had relatively fewer children, which agrees with similar findings in this country (34, 36, 45). The level of home care, as assessed by an experienced social worker, was judged to be higher in the nonworking mothers' homes but was not objectively rated nor statistically evaluated. The type of work in which the mothers were employed varied but was chiefly in factories, shops, and domestic service. The findings relate to intervening conditions, such as the kind of care the babies received, rather than to observed or reported conditions of the babies themselves. Among working mothers' children fewer were breast-fed and for shorter periods; more infants received medical care but fewer were brought to the Child Welfare Clinics. We wish that data had been presented to show what, if any, was the effect of these differing conditions upon the infants.

Perceptions and Attitudes of Children

With the current changes in sex roles, a few investigators have been interested in finding out to what extent these changes have affected children's perceptions of mother and father on the assumption that such perceptions will influence the learning of appropriate masculine and feminine sex roles. If perceptions of children have become confused because of changes in women's roles, there may be interference in the identification process. In addition, the attitude of acceptance or rejection of the role the mother plays may influence a girl's wanting to be like or a boy's admiration of his mother. A child's attitude toward the mother's role may also affect the child's happiness and emotional well-being.

There are three studies which have attempted to compare the sex role perceptions of children of employed mothers with those of children of nonemployed mothers. The earliest study was one made by Mathews in 1934 (31). This was a study of 100 children in grades 5 to 9 whose mothers had full-time jobs outside the home, paired with a similar number of children of nonworking mothers for sex, grade, school, community, and father's occupation. The children were given a questionnaire containing 100 items relative to the mother role and to home life situations and, as will be reported later, relative to the children's attitudes toward these conditions.

Statistically significant differences were found between the two groups on 29 items concerning home conditions. One is impressed, on looking at the tables, with the fact that, for most of the 29 items, where a difference was found, a large percentage of nonworking as well as working mothers' children reported that the condition existed in the home. Most of the children of both groups (88 per cent or more) reported their home was cozy and had nice furniture, suppers were usually hot cooked, meals were usually on time, mother usually took care of the child when sick, and stockings were

usually darned. The discrepancy between the two groups was greater on the following items: a higher percentage of working mothers' children wore soiled clothes to school (30 vs. 3 per cent), had a sense of hurry around home (52 vs. 33 per cent), were scolded by a tired mother (74 vs. 45 per cent), and sometimes had to make their own breakfast (45 vs. 24 per cent). It is surprising to find that fathers being active in the home was reported by fewer of the working mothers' children: fewer playing games with the children (65 vs. 80 per cent) or taking care of the children (68 vs. 83 per cent).

A comparison of a group of 38 intact families in which the mother worked with a paired group of nonintact (father deceased or separated) families in which the mother worked gave a significantly higher score on family conditions for the children in intact families but no difference in attitude scores.

Mathews' study was made over a quarter of a century ago, when full-time working hours could be as much as 10 or 11 hours a day, when automatic machines were rare in housekeeping, and when fathers lost status (in their own eyes at least) when they participated in family chores. A recent study of sex role perceptions of children, under modern conditions, has been made by Hartley (22), as part of a larger investigation focused on women's social roles. This study included 47 boys and 110 girls; 23 five-year-olds, 63 eight-year-olds, and 71 eleven-year-olds, half of them with employed mothers and half with nonemployed mothers. There were no recent immigrants or members of minority groups in the sample. All subjects were born in the United States, came from intact families, and had no outstanding emotional difficulties.

Answers to the first question, which related to how children perceive male and female social functioning, were elicited through an indirect verbal device: suppose you met a person from Mars, etc. The children's answers showed no confusion. Of the 640 item-mentions of women's roles, 64.5 per cent related to the traditional domestic activities of women, only 6 per cent to the work-role. Responses from boys and girls were similar in distribution.

Although only 6 per cent of the items referred to work roles of women, 29 per cent of the boys and 24 per cent of the girls mentioned this. Significantly more sons of working mothers than sons of nonworking mothers stated work roles for women. Daughters were in the same direction but not significantly so.

In regard to men's roles, 27 per cent of the mentions referred to work roles, 26 per cent to traditionally masculine domestic activities, and 6 per cent to domestic activities usually considered as women's work. There were 23 per cent of the girls and 37 per cent of the boys who mentioned these nontraditional domestic roles for men. Boys from lower middle class and working class homes mentioned such activities for men significantly more frequently than boys from upper middle class homes. This tendency was not related to the work status of their mothers.

The second part of the study attempted to find out how children perceived the work role of women in relation to the woman herself, as well as her children, and in comparison with similar perceptions regarding men's work role. Data were secured by means of a pictorial projective-type device which depicted a mother leaving a young child to go to work (similar one for father). In order to ascertain how the children perceived the mother (or father) as feeling about her work, replies were dichotomized into those indicating and those not indicating some degree of discomfort, conflict, or unhappiness on the part of the adult. Of 143 subjects, 64 per cent perceived the woman as suffering some degree of discomfort at leaving a young child to go to work. Neither the mother's work status nor the social class of family nor the sex of child were influential. However, the age variable was, with an increasing proportion of children at five, eight, and eleven years perceiving maternal discomfort. This finding may be related to Groves' report (20) and Mathews' findings (30) that older children in the elementary school do not like to have their mothers away from home when they need them. Even more of the children (69 per cent) thought the father had unhappy feelings about going to work and leaving a child. Slightly more children of working mothers than of nonworking mothers made such statements.

When positive and negative attitudes toward the work itself (rather than leaving the child) were analyzed, 54 per cent considered that the mother had positive or neutral feelings and 61 per cent judged the father as having these feelings. Fewer children of working, than of nonworking, mothers thought the man might not like to go to work.

An experimental approach to the problem of role perception was reported by Duvall in 1955 (10). The subjects were two groups of 30 children each, in kindergarten and first grade, half of whom had mothers who were working (no definition of work) and half of whom had mothers who were homemakers. All were intact families with no other adult living in the household. Children were matched by groups for age, sex, religion, occupation of father, presence or absence of siblings, and ordinal position in family. The data consisted of the responses of each child in two individual sessions to a series of photographs and line drawings depicting 13 different roles of mother.

There were a few differences found between the perceptions of the two groups of children. The children of nonworking mothers were more conservative in their conceptions in that more of them reported that the mother performed the role depicted and that they preferred her to do it. Children of working mothers significantly less often selected the mother as the person who prepared food or cared for the child during illness.

From these two recent studies, one might judge that children are not vague or confused about the sex role of their parents, whether the mother is employed or not. There is some evidence that the children perceive the father's role as more active in the home in traditionally feminine activities

than the children did in 1934. However, the primary role of the mother remains in the domestic activities and that of the father in work and in traditionally masculine domestic activities, as far as the children are concerned.

The earliest report we have found of children's attitudes toward their mothers working outside the home was a discussion in a chapter, devoted to the psychology of the woman who works, in *American Marriage and Family Relationships* by Ernest Groves and William Ogburn in 1928 (20). On the basis of informal interviews with children of different ages, Groves was interested in tracing the changes which occur in children's attitudes as they mature. He says that the young child uncritically accepts and admires his mother as she is, whether she works or stays at home. As he gets older, a child may see the advantages to himself of the freedom he gains from his mother's absence. As adolescence approaches, he is likely to want his mother to be like the mothers of his friends, be that worker or housewife. In later college years, the daughter or son may be proud that the mother can hold a real job. Groves believed that the child at any age could accept the mother's absence due to work because that is a routine to which he can accommodate himself but that sporadic, irregularly timed absences for the mother's pleasure may be met with protest.

It was this informal statement of Groves which stimulated Mathews in 1933 and 1934 to study more systematically the attitude of children to maternal employment (30, 31). In the first study, the author, like Groves, was primarily interested in investigating the changes in attitude that occur with age. Statements were collected regarding advantages and disadvantages of mothers working regularly outside the home from nearly 400 subjects from fifth graders to college seniors. There was no information regarding whether the mother of the child respondent was working or had worked outside the home. In general, Mathews found the following sequence: fifth grade, advantages and disadvantages were almost equal in frequency, children conforming but feeling mothers are needed at home for child's personal comfort; eighth grade, about 55 per cent responses critical, objecting seriously to state of affairs if mother works; high school (grades 9, 11, 12), about 56 per cent responses critical because children do not want to assume responsibilities for their own clothes, meals, etc., they want mother to be on hand when they need her; university seniors, almost 66 per cent responses were listed under disadvantages, but the author states that at the college age the question of mothers working outside of the home is an open one with some expression of pride in women working.

In the 1934 study (31), which was discussed in the section on roles, Mathews reported on the responses of 100 children (grades 5 to 9) with full-time employed mothers paired with a similar number of children of nonemployed mothers for sex, grade, school, community, and father's occupation. Although there were nine items regarding the child's *attitude* toward his home conditions in which there were statistically significant

differences, in five of them a higher percentage of working mothers' children gave approval and in four items a higher percentage of nonworking mothers' children gave approval. Forty per cent of the working mothers' children approved of their mothers working, while 93 per cent of the nonworking mothers' children approved of their mothers staying home. Significantly more girls than boys approved of their mothers working.

Among the more recent investigations, Hartley (22), in the study described under roles, asked the elementary school children what they expected to do when they grew up. Significantly more daughters of nonworking mothers stated "housewife"; and more daughters of working mothers mentioned professional areas such as doctor, lawyer, creative worker, although this difference was not statistically significant. Significantly more daughters of working mothers said they would continue working after marriage. When Duvall (10), in the study described under roles, questioned the children as to whom they preferred to perform a specific role, significant differences between the two groups were found in only one role: more working mothers' children preferred to have the mother work.

There are only two other studies which might have any bearing on the attitudes of children toward maternal employment. Nye (36), in the study discussed under adolescent adjustment, reported no difference in the affection for the mother of adolescents of working and nonworking mothers. Moler (33), in 1948, made an analysis of case records of a family service agency to study family functioning and family relationships. There were 82 working mothers (children from infancy to 18 years, Negro and white, intact and separated families) but there was no control group of nonemployed mothers. The author states that children's attitudes toward maternal employment (as reported by mothers) varied from acceptance to rejection, but we do not know how the attitudes were distributed on this continuum.

Attitude of Mother toward Work

In a recent paper, Hoffman (27) argues that the effect of maternal employment on children will differ according to the mother's attitude toward her work. The theory she presents is briefly that the mother who likes her work will feel guilty about it, will therefore try to compensate for it by demonstration of affection and adequate discipline but fewer demands on the child, while the mother who dislikes her work will be quite guiltless and therefore show less positive affect, less discipline, and more demands on the child. These differences in parent-child relations would bring differences in child behavior. The study she presents is of 88 working mothers from intact, white families, 65 of whom liked their work and 23 of whom disliked it. These were matched with 88 nonworking mothers from intact, white families of similar occupational level of father, sex and ordinal position of child. Data were obtained through interviews with mothers, a questionnaire to the children, teacher ratings, and classmates' opinions.

The children of mothers who liked their work associated significantly more positive affect with their mothers than did the children of nonworking mothers. The children of mothers who disliked their work associated both less positive (not significant) and less negative affect (significant) with their mother than did children of nonworking mothers. The mothers who liked their work reported significantly more feelings of sympathy, less feelings of hostility, and less severe discipline than the nonworking mothers. The mothers who did not like their work reported significantly less power assertion over their children and significantly more assertiveness of the child toward the mother.

There were four reports on child behavior, from child, from mother, from teacher, and from classmates. We give only the findings which were statistically significant. The children of mothers who disliked work reported more regular participation in household tasks. In peer group characteristics the children of mothers who liked work were more likely to play with younger children than those of their own age, to take less initiative in making friends, and to have less influence on peers. The children of mothers who disliked their work showed less impulse control, used physical force more, and responded to frustration in a nonadaptive manner.

Although all of the expected findings did not materialize, the results show that the mothers with positive attitudes toward their work do behave differently toward their children than the mothers who have negative attitudes toward their work. And the children in turn behave differently. On the whole, the mothers with positive orientations toward work are relatively high in affect toward the child, use milder discipline, and require less in household tasks, while their children are less assertive and less effective in social relations. The findings regarding the mother with negative work orientations are not so clear-cut, and Hoffman interprets this as indicating less involvement with the child; the child is assertive and hostile.

This study seems to us to be outstanding because it attempts to study not only the working mother and her child but the psychological conditions of parent-child relationship. In addition, it does not assume that all working mothers are alike and categorizes them on one important variable of attitude toward work. However, the theory, that the mothers who liked their work were motivated by guilt in their relations with their children, seems only one possible, and to us not probable, explanation of the mother's behavior. An equally cogent argument could be based on the assumption that there was some underlying characteristic of the mother which determined both her attitude toward her work and her attitudes toward her children.

Berger (4) looked at this problem from another angle. As a clinician, he was concerned with 22 children of mothers who had been employed before marriage and now were frustrated because of their desire to return to work. All of the children had been referred to the Harriet Lane Children's Psychiatric Service of Johns Hopkins Hospital because of behavior

difficulties. In analyzing the case records, Berger concluded that the children's difficulties represented, in great part, a response to maternal demands for conformity which was a displacement to the child of the mother's frustrations regarding employment. Fifteen of the mothers were described as perfectionistic and prestige-oriented, demanding conformity and superiority in their children's behavior as a means of maintaining their own prestige. The other seven mothers were described as insecure, using inconsistent methods in demanding adherence to their conception of socially acceptable standards. Following clinical help, 16 of the cases had no difficulty with the second child as a result of shift in attitude and improvement in marital relation.

Sears, Maccoby, and Levin (43) also present some findings regarding mothers who were full time homemakers but who had previously had work experience. Of 379 mothers, 30 per cent had worked before but not after marriage, 43 per cent had worked after marriage but not since their kindergarten-aged child (who was subject of the study) was born, 17 per cent had worked at least part time since this child was born, and only 7 per cent had never worked. The authors wished to find out whether work experience in any sense "spoiled" these women for assuming their later roles of wife and mother. In regard to their attitude toward pregnancy, 48 per cent of those who had worked, compared with 29 per cent of the nonworkers, were "delighted" when they learned they were pregnant. There was no difference among the three groups of workers. The authors also explored how much conflict the mothers felt in shifting from employment to motherhood or about combining the two. The answers to the question, "How did you feel about giving up your work?" were grouped in four levels: much sacrifice, 6 per cent; some sacrifice, 13 per cent; no sacrifice, 33 per cent; glad to give up work, 28 per cent. Among the lower socioeconomic group, attitudes toward work made little difference in the acceptance of pregnancy. Among the upper-middle status group there were few of those who reported much sacrifice in giving up work who were "delighted" with pregnancy; but about half of the mothers in the "some sacrifice" group were "delighted" with pregnancy; about a third in the "no sacrifice" group who were indifferent about work were "delighted" with pregnancy; and a "high proportion" among those who were glad to give up work were "delighted" with pregnancy. The authors conclude that, despite the fact that so many of the women had worked at one time or another, there was relatively little conflict about acceptance of the mother role.

Summary and Hints for the Future

When one concludes a review of this kind, one is impressed with the number of different and opposing findings which research concerning the effect of maternal employment on children has produced. One can say

almost anything one desires about the children of employed mothers and support the statement by some research study. *Regarding delinquency:* there is no difference between children of working and nonworking mothers (2, 19, 25); only the sporadic worker has more delinquent sons (19); more children of working mothers report that they commit delinquent acts (36). *Regarding the adjustment of adolescents:* there is no difference in psychosomatic symptoms in children of working and nonworking mothers (36); more sporadic workers have sons with emotional conflict and higher hostility (19); daughters of working mothers are less well-adjusted (11). *Regarding adjustment of elementary school children:* there is no difference in the two groups of children in adjustment (21) and in behaviors related to dependency (24); working mothers probably contribute less than their share of extremely aggressive and extremely inhibited children (1); working mothers' children are more antisocial (7) and are more withdrawing and less self-reliant (41); children of mothers with positive orientation to work are less assertive and less effective in social relations while those of mothers with negative attitude toward work are more assertive and hostile (27). *As to achievement in school:* in grades 3 through 6, children of employed mothers compared with those of nonemployed mothers are rated by teachers lower in intellectual performance (27), but boys do not differ in achievement test scores (24); in grades 9 through 12 there is no relation between maternal employment and school marks (36); in college, women students who are academically successful have mothers with intellectual interests and aspirations (42). *As to the development and adjustment of preschool children:* there is no difference between children of working and nonworking mothers in behavior relevant to dependence and independence (45); relatively few children of working mothers are under stress in a nursery school (6); working mothers' children in a Day nursery show less disturbed behavior than children in a Residential nursery whose mothers are absent (23); no difference in combined problems relating to eating, sleeping, and elimination between working mothers' children in a Day nursery and nonemployed mothers' children at home, but more "problem" children belonging to the working mothers (16).

How can we explain these divergent findings? There is no question that, in many studies, the lack of control of pertinent variables, such as socioeconomic status and intactness and size of family, would account for some of the discrepancies in results. Another factor which may influence results is the time of data collection. Certainly, studies made before World War II were made in a cultural milieu relative to maternal employment which differed considerably from more recent years. If we consider only those studies in which there were adequate controls of relevant variables and which were based on data collected since 1946, the findings are sparse but not quite so divergent. In studies which met these criteria, there was no statistically significant relation found between maternal employment and delinquency (2), adolescent adjustment (36), school marks in high school (36)

and dependent-independent behavior of five-year-olds (45). Relations were found between maternal employment and reports of delinquent acts by adolescents but were statistically insignificant when demographic variables were controlled (36). Although elementary school children of employed mothers were rated lower in intellectual performance, the ratings were made by teachers who presumably knew the work status of the mothers (27). The only study which attempted to take into account differing attitudes of mothers toward work indicated quite clearly, it seems to us, that underlying characteristics of the mother may influence a mother's attitude both toward her work and toward her child with consequent effects on the behavior of the child (27).

We have a few suggestions which may be useful in future research in this field. They relate to the definition of maternal employment and nonemployment, some comments regarding occupations and economic milieu, characteristics of the mother, and behavior of the child.

1. *Definition of maternal employment and nonemployment.* It seems essential that the criteria by which we designate a mother as employed or not employed be more precisely defined than they have been in many of the studies we have reviewed. The length of time the mother has worked, the degree of continuity-discontinuity of the mother's work history, as well as the number of hours the mother works per week, may make important differences in the life of the child (19, 38, 45). In like manner, we should know whom we are discussing when we say nonemployed mother. Does this mean a mother who happens not to be employed on the day a child fills out a questionnaire, or cannot we be more precise and define the nonemployed mother as one who has not worked during the life of the child whom we are studying (45). Certainly for the sake of clarity, the nonworking mother should be one who really has not worked and not a sporadic, seasonal, or recently terminated worker. Categorization of mothers according to the age of the child during the years of their work or nonwork might give us clues to the influence of child maturity on the effects of maternal employment.

2. *Maternal occupations in relation to family.* No one, as yet, has described the many variations which exist in maternal employment so far as relations with children in the family are concerned. Take, for example, the amount of contact a mother has with her child. Roger Barker writes that the mother of Raymond Birch (hero of *One Boy's Day*) was employed. Because of this, Raymond walked most of the way to school with his mother (when otherwise he would have been separated from her); and he played in her office, as much or more than he would have played in the home, if his mother had not been employed. Analysis of records show that Raymond had more contact with his employed mother than Ben, a friend of same age and grade, with his nonemployed mother. A long time ago, when nursery schools were under criticism as places where mothers "dumped" children, the Iowa Child Welfare Research Station found that mothers

who sent their children to nursery school had more contact with their children than mothers who kept their children home.

Hoffman (27), who found relations between maternal attitudes toward work, mother-child relations, and child behavior, reports that the attitude of a mother toward her work depended in part on the kind of work the mother did, more of those who held jobs in upper socioeconomic categories having positive attitudes toward their work. Although Miller and Swanson (32, p. 130) found this to be a noninfluential factor in childrearing practices, they were relating the job of the father to the rearing practices of the mother. It certainly looks as if it would be profitable to investigate the relation of the specific kind of work a mother performs to mother-child relations and child behavior.

There is another lead from Miller and Swanson (32) which ought to be followed through. After determining social class by husband's occupation, the authors dichotomized each class into integration settings. These settings were defined by the characteristics of the economic conditions under which the husband worked: individuated entreprenurial or welfare bureaucratic. The first defined the competitive, risk taking, independent, insecure economic world dominant in the nineteenth century but still operating to some extent at the present time. The bureaucratic defined the relatively more secure conditions of work which began largely since 1900 as industry increased in size, unions represented workers, and welfare benefits, such as stabilized wages, unemployment insurance, and retirement payments, developed. The authors find that there are differences in the goals of mothers for their children and in some of their child care practices related to the kind of economic setting in which the husband works. They see in the changing economic conditions of life the basic causes for changes not only in parental practices but in the general nature of family life. According to their analysis (32, p. 101-102) based somewhat on Parsons (39), the psychological effect of the wife working outside of the home would be different in the entreprenurial family than it would be in the bureaucratic family. When the economic system emphasizes extreme competition, the marriage relation is enhanced if the husband only works. There is thus no competition between husband and wife and they gain in stability through complementary roles: his active and aggressive, hers passive and accommodative. On the other hand, the bureaucratic situation, as they describe it, takes from the worker the need for striving, for risk taking, and active responsibility for his own future. Under these circumstances, it becomes increasingly possible for women to participate in the economy without as serious a threat to the marital relationship. Miller and Swanson did not follow up this promising lead for comparison of family relationships and child behavior in working mother families living under the two conditions described —but someone ought to do it.

3. *Characteristics of the mother.* It is clear from the large number of studies of mothers' practices, made in the past 20 years in the United States,

that mothers differ widely in methods of rearing their children whether the mother works or not. There are many factors, overt and subtle pressures, which influence how parents bring up a child, including the parent's values and beliefs, his own upbringing and his attitude toward it, his experiences with other children and people, his relation with his spouse, the neighborhood in which he lives, the child and his relation with the parent, and so on (50). Hoffman (27) has already shown the relation of the employed mother's attitude toward her work and the behavior of the child. Glueck and Glueck (19) pointed to the mother whose sporadic work habits seem a function of deep-seated emotional difficulties. Perhaps just as crucial is the nonworking mother's attitude toward her job of child care and homemaking. Berger (4) gives some insightful clues to this which might be followed by more systematic research. Alberta Siegel (44) is conducting a study of professionally trained women who are married and have children and is invoking the concept of reference group orientation in studying four types of women (and their children): employed mothers who are satisfied to combine work with homemaking and those who are not, and nonemployed mothers who are satisfied to devote full time to homemaking and those who are not.

Differentiating between characteristics of mothers should prove a fruitful area for investigation. It has already been shown that the quality of warmth-coldness of the mother has a pervasive influence on the mother's behavior (43); perhaps this should be investigated in regard to working and nonworking mothers. It is possible that some mothers who like their work are women of warmth, and their relations with their children are motivated by this rather than by guilt. It is worth looking into. A mother may be dissatisfied and unhappy for many reasons (her husband, her children, herself), and such women are found both at home and at work (14). Of course, what we would really like to know is whether the employed woman would be a different mother if she stayed at home and, if so, in what ways. There are no studies to help us here. An investigation which studied mother practices and child behavior before maternal employment, during the initial adjustment period after the mother was employed, and during a later period while the mother was employed would reveal some of the problems of adjustment and the methods of coping with them used by mother and child.

4. *Behavior of children.* We cannot help but wonder whether the discrepancy in results of some studies may not be due in part to (a) differences in the definition of the behavior of the child and (b) differences in the method of collecting data regarding child behavior. Let us look at the matter of definition of behavior. In the studies on delinquency, the only study which sharply disagrees with the others in finding a relation of delinquency to maternal employment (36) is one in which delinquency is defined differently, i.e., not from court records but from a child's responses to a questionnaire regarding delinquent acts. There are no two studies regarding

adjustment of adolescents or elementary school children which use the same criteria for adjustment. Even in such a relatively simple area as school achievement, one study uses teacher ratings of intellectual performance (27), another uses school grades (36), and a third uses achievement test scores (24).

Our next point relates to the sources which were used to gain information regarding the behavior of the children of the two groups of mothers. The 27 studies reviewed which analyzed children's behavior used data given by mothers (14, 23, 27, 33, 42, 52); by teachers (1, 6, 7, 16, 21, 27); by trained observers in school (1, 23, 24, 45); by the classmates of the children (21, 27); and by the children themselves (10, 11, 21, 22, 23, 27, 30, 31, 36, 42). Official records supplied data, too: census (9, 12); school (2, 19, 24, 25, 36, 42); court (2, 19, 25); medical, social, psychological case records (4, 13, 14, 19, 41). Ten studies used more than one source: mother and case record (14); mother, observer, children (23); mother, teacher, classmates, children (27); mother, children, school (42); teacher, observer (1); teacher, classmates, children (21); observer, school (24); school, court (2, 25); school, court, case record (19). All but two of the studies using multiple sources are research of the 1950's, three of them as yet unpublished.

The techniques used for gathering data on children's behavior include interviews, questionnaires, ratings, projective materials, and observations. Only two studies of those directly concerned with comparing the behavior of working and nonworking mothers made use of direct observation of children's behavior, and one of these (24) was the follow-up of the other (45). It is not surprising that most of the studies relied on questionnaires, interviews, or case records for their data, since the method of observation is both expensive and time consuming. Stevenson and Stevenson (47), who have used observations extensively in research with children, testify to the disadvantages mentioned, but believe that observation of children "in spite of these disadvantages, remains the best way of collecting data where detailed information about the social interaction of children is desired" (p. 72).

The investigators who have used the observational technique in this area of research have all made their observations in school situations: nursery, kindergarten, or grade school. No one, as far as we could determine, has made observations of child or parent at home in working and nonworking mothers' families, though Radke-Yarrow (40) and her associates have been exploring the feasibility of making home observations and developing techniques and instruments for further research. The symposium on Ecological Methods in Child Research, led by that advocate of naturalistic observations, Roger Barker, held at the Meeting of the Society for Research in Child Development in 1959 (46) included discussions of many of the issues pertinent to the use of observations in naturalistic situations. It should be useful in stimulating others to use more direct methods in obtaining data regarding the behavior of children of working and nonworking mothers.

The studies reviewed have yielded surprisingly little information regarding differential effects of maternal employment on sons and daughters. We would expect in families where mother role has changed through outside employment, with complementary adjustments in father role, that boys and girls will be learning consciously and unconsciously different patterns of sex-appropriate behavior than boys and girls in families where the mother is not employed. In seven of the studies reviewed the sample was limited to one sex: to boys (1, 2, 19, 24); to girls (11, 25, 42). In nine other studies, there is no differentiation in the sex of the subjects (4, 6, 9, 12, 13, 14, 30, 33, 52), and in two no analysis of sex differences (16, 23). A few studies found no significant sex differences (21, 36) or reported none that were related to the employment status of mothers (7, 10).

Hartley's exploratory study (22), which focused on children's concepts of male and female roles in relation to work status of mothers, indicates some differences in role perceptions of boys and girls, only a few of which were related to maternal employment. Significantly more sons of working mothers than nonworking mothers assigned work roles to women; for daughters the difference was in the same direction but not statistically significant. Significantly more daughters of nonworking mothers gave "housewife" their primary choice of what they would do, and more daughters of working mothers mentioned nontraditional areas. More daughters of working mothers said they thought they would continue work after marriage.

Regarding sex differences in overt behavior related to maternal employment, there is little that has been reported. Although Hand (21) did not find significant differences between the percentage of well-adjusted and maladjusted children of working mothers, he did find a higher precentage of well-adjusted girls and a higher percentage of maladjusted boys in the working mothers' group. This tendency is supported by Mathews' (31) finding that more daughters than sons of working mothers displayed "desirable" attitudes toward home life situations. Rouman (41) found that the percentage of daughters of working mothers with problems increased with age.

In the large number of child behavior items analyzed by Hoffman (27) only one showed sex differences. Teachers rated the boys of both working mothers' groups (those with positive attitude toward work and those with negative attitude) as more dependent than boys of nonworking mothers. The finding relating to sons of mothers with negative attitude toward work was statistically significant. That there may be a sex difference in behavior related to the dependency-independency continuum for children of working and nonworking mothers is suggested by Siegel, Stolz, Hitchcock, and Adamson (45). They found that, although there were no statistically significant differences between sons or between daughters of working and nonworking mothers, there was an interesting complementary relation between the findings for boys and for girls. In eight of 10 behavior variables studied the group differences between working and nonworking mothers'

children were in the opposite direction for the two sexes. For example, the working mothers' sons were lower in aggression than sons of nonworking mothers whereas the daughters of working mothers were higher in aggression. The authors felt that this strong tendency toward differential direction in findings for the two sexes warrants further study of sex-typing. Whatever the effects of maternal employment on sex appropriate behavior of sons and daughters, they will probably be related to the developmental maturity of the child (20, 22, 30, 41). Future research will need to take this into account.

Finally, we should like to point out that the studies we have reviewed indicate clearly that children of employed mothers are not all alike: some of them are delinquents, some are not; some show symptoms of maladjustment, some are quite well-adjusted; some do well in school, some have a difficult time; some are self-reliant, some overly-dependent. What we need to know is why some children of employed mothers develop acceptable behavior and others do not. After reading these studies, it looks as if the fact of the mother being employed or staying at home is not such an important factor in determining the behavior of the child as we have been led to think. It might be more profitable to focus attention on the psychological conditions within the family, especially on the personal characteristics of the mother and father and the kind of supervision and guidance which they provide, not only when the parents are at work but when they are at home as well.

The fact of married women with children being employed outside of the home is a social phenomenon which invites investigation, but, unless research is oriented to take account of the variations in the nature of maternal employment and the complex interpersonal relations in the family, results seem foredoomed to be inconclusive.

References

1. Bandura, A. The relationship of family patterns to child behavior disorders. Research in progress.
2. Bandura, A., & Walters, R. H. *Adolescent aggression.* New York: Ronald Press, 1959.
3. Beer, Ethel S. *The day nursery.* New York: Dutton, 1938.
4. Berger, I. L. Psychopathologic attitude of frustrated previously employed mothers toward their offspring. *J. nerv. ment. Disorders,* 1948, 108, 241-249.
5. Bossard, H. S. *The sociology of child development.* New York: Harper, 1948. (Rev. Ed., 1954, pp. 284-285)
6. Bostock, J. *Stress in the pre-school child.* Unpublished manuscript. Australian Presch. Ass., 1957.
7. Cummings, Jean D. The incidence of emotional symptoms in school children. *Brit. J. educ. Psychol.,* 1944, 14, 151-161.

8. David, H. Work, women and children. In E. Ginsberg (Ed.), *The nation's children*. New York: Columbia Univer. Press, 1960. Pp. 180-198.

9. Dunlop, J. C. The fertility of marriage in Scotland: a census study. *J. roy. statist. Soc.*, 1914, 77 (Part III), 259-288.

10. Duvall, Elise B. Conceptions of mother roles by five and six year old children of working and non-working mothers. Unpublished doctoral dissertation, Florida State Univer., 1955.

11. Essig, Mary, & Morgan, D. H. Adjustment of adolescent daughters of employed mothers to family life. *J. educ. Psychol.*, 1946, 37, 219-233.

12. England and Wales, 1911 Census, Vol. XIII. *Report on the fertility of marriage*. London: His Majesty's Stationary Office, 1923.

13. Ferguson, T. Mothers employed outside the home. *Glasgow med. J.*, 1953, 6, 221-244.

14. Fisher, Mary S. Marriage and work for college women. *Vassar Alum. Mag.*, 1939 (January), 7-10.

15. Forest, Ilse. *Preschool education*. New York: Macmillan, 1927.

16. Glass, Netta. Eating, sleeping, and elimination habits in children attending day nurseries and children cared for in the home by mothers. *Amer. J. Orthopsychiat.*, 1949, 19, 697-711.

17. Glueck, S., & Glueck, Eleanor. *Five hundred delinquent women*. New York: Knopf, 1934.

18. Glueck, S., & Glueck, Eleanor. *One thousand juvenile delinquents*. Cambridge, Mass.: Harvard Univer. Press, 1934.

19. Glueck, S., & Glueck, Eleanor. Working mothers and delinquency. *Ment. Hyg.*, 1957, 41, 327-352.

20. Groves, E. R., & Ogburn, W. F. *American marriage and family relationships*. New York: Holt, 1928. Pp. 72-75.

21. Hand, H. B. Working mothers and maladjusted children. *J. educ. Sociol.*, 1957, 30, 245-246.

22. Hartley, Ruth E. Children's concepts of male and female roles. *Merrill-Palmer Quart.*, 1960, 6, 83-91.

23. Heinicke, C. M. Some effects of separating two-year-old children from their mothers—A comparative study. *Hum. Relat.*, 1956, 9, 102-176.

24. Hitchcock, E. Alice. Relation of maternal employment to school behavior and achievement of intermediate grade boys. Unpublished manuscript, 1959.

25. Hodgkiss, M. The delinquent girl in Chicago: II. The influence of broken homes and working mothers. *Smith Coll. Stud. Soc. Work*, 1933, 3, 259-274.

26. Hoffman, Lois W. Effects of the employment of mothers on parental power relations and the division of household tasks. Unpublished manuscript, 1959.

27. Hoffman, Lois W. Effects of maternal employment on the child. Paper read at Natl. Council Fam. Relat., Ames, Iowa, 1959.

28. Kitagawa, Evelyn M. The family as a unit in the work force. Unpublished manuscript, Population Research and Training Center, Univer. of Chicago.

29. Maccoby, Eleanor E. Children and working mothers. *Children*, 1958, 5, 83-89.

30. Mathews, Selma M. The development of children's attitudes concerning mothers' out-of-home employment. *J. educ. Sociol.*, 1933, 6, 259-271.

31. Mathews, Selma M. The effects of mothers' out-of-home employment upon children's ideas and attitudes. *J. appl. Psychol.*, 1934, 18, 116-136.

32. Miller, D. R., & Swanson, G. E. *The changing American parent.* New York: Wiley, 1958.

33. Moler, Jennie. Home making problems of working women. *Smith Coll. Stud. Soc. Work*, 1948, 19, 27-62.

34. National Manpower Council. *Womanpower.* New York: Columbia Univer. Press, 1957.

35. Nye, F. I. Employment status and recreational behavior of mothers. *Pacific Sociol. Rev.*, 1958, 1, 69-72.

36. Nye, F. I. Employment status of mothers and adjustment of adolescent children. *Marriage Fam. Living*, 1959, 21, 240-244.

37. Nye, F. I. Employment status of mothers and marital conflict, permanence and happiness. *Soc. Problems*, 1959, 6, 260-267.

38. Nye, F. I. Employment status and maternal adjustment to children. Paper read at Amer. Sociol. Soc., Chicago, 1959.

39. Parsons, T. An analytical approach to the theory of social stratification. *Amer. J. Sociol.*, 1940, 45, 852-853.

40. Radke-Yarrow, Marion. Report to the committee on maternal employment. Bethesda, Maryland, October 1958.

41. Rouman, J. School children's problems as related to parental factors. *J. educ. Res.*, 1956, 50, 105-112.

42. Sanford, N. Is college education wasted on women? *Ladies Home J.*, 1957, 74, 5 (May), 78-79, 198.

43. Sears, R. S., Maccoby, Eleanor E., & Levin, H. *Patterns of child rearing.* Evanston, Ill.: Row, Peterson, 1957.

44. Siegel, Alberta E. Professionally trained women and their children. Research in progress, 1959.

45. Siegel, Alberta E., Stolz, Lois M., Hitchcock, E. Alice, & Adamson, Jean M. Dependence and independence in the children of working mothers. *Child Develpm.*, 1959, 30, 533-546.

46. Society for Research in Child Development. Proceedings of the Twenty-fifth Anniversary Meeting. *Child Develpm.*, 1960, 31, 215-218.

47. Stevenson, H., & Stevenson, N. G. Social interaction in an interracial nursery school. *Genet. Psychol. Monogr.*, 1960, 61, 37-75.

48. Stolz, Lois Meek *et al. Father-relations of war-born children.* Stanford Univer. Press, 1954.

49. Stolz, Lois Meek. Woman's search for a new self. *J. Natl Ass. Women Deans & Counsellors,* 1959, 22, 3 (April), 125-130.

50. Stolz, Lois Meek, *et al.* Values, beliefs and other influences on parental behavior. Research in progress.

51. Stone, L. J. A critique of studies of infant isolation. *Child Develpm.*, 1954, 25, 9-19.

52. (Unsigned) Die Arbeiterin als Mutter. (The working woman as mother.) *Metallarbeiter-Ztg.*, 1931, 49(41), 297. (Abstract in *Child Develpm. Abstracts,* 1932, 6, No. 1073.)

CONCEPTUAL AND METHODOLOGICAL DEVELOPMENTS IN PARENT-CHILD RESEARCH

A symposium presented at the Chicago meeting of the Midwestern Psychological Association
May 8, 1959

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Janet E. Rafferty 785

A Conceptual Formulation for Some Research on Children's Achievement Development
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INTRODUCTION [1]

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This group of papers was prepared for and presented at the 1959 Midwestern Psychological Association meetings in the symposium, "Conceptual and Methodological Developments in Parent-Child Research." Drs. Crandall, Sigel, and Tyler read papers, and Drs. Harris and Martin acted as discussants. Because of interest evidenced in this topic, these papers have been assembled.

In the field of psychology there has been an enduring interest in the study of parent-child relations. Many investigators have addressed themselves to the problem of trying to assess the nature of such relations, of attempting to determine the effects of parental behaviors on the developing child, and a multitude of similar problems. Current psychological literature abounds with findings from such studies, and yet there are many gaps in our knowledge of parent-child relations. Perhaps, in part, this state of affairs may be accounted for by our heavy emphasis on empirical and pragmatic research, with disproportionately less focus on conceptual and methodological problems. While the latter focus on concepts may present more headaches and fewer immediate rewards, it appears crucial in order to make any systematic advances in knowledge.

In these papers each of the participants has focused primarily upon the conceptual developments and on the consequent methodology in his current research. Discussion of results has been used only for illustrative purposes. This approach is in sharp contrast to the usual presentation in which investigators spend most of their time talking of findings, after quickly relating methodology, and giving only a slight nod to the concepts utilized. The

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rationale for the approach in this symposium is that there is a need to focus on the common problems of conceptualization and on the relation between concepts and methods.

It is interesting to note that each of the projects utilized essentially the same data sources, i.e., the interview as a source of parental data and observations of children as the source of child data. And yet, each participant has approached this problem in somewhat different ways.

There are selective emphases in each of the reports. Research reported by Crandall deals with achievement behaviors in parents and their children and the relevant parameters in measurement. In contrast, Sigel's report concerns influence techniques used by parents and their children; his particular emphasis is on method of study of parents. Finally, in the research reported by Tyler, the focus is on the exploration of motivational characteristics of parents and their children and on the parallel assessment of such motivations.

Despite differences in their approaches, these reports represent current attempts to come to grips with conceptual problems in parent child research. As such, not only do they suggest some potentially rewarding conceptual developments, but also point to the real gains to be made from such a focus.

A CONCEPTUAL FORMULATION FOR SOME RESEARCH ON CHILDREN'S ACHIEVEMENT DEVELOPMENT[1]

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The general aim of this symposium was to bring together representatives of several teams of child development researchers to discuss theoretical and methodological problems arising from their current research efforts.[2] The problems I will discuss are ones which emanated from recent and current research on children's achievement behaviors and the roles parents play in their development. Almost two years ago we began preliminary research in this area. At that time, a number of studies had been conducted on achievement motivation, especially by McClelland and his colleagues. Many of these have been summarized in McClelland's book, *The Achievement Motive* (7). Reports of additional investigations in this area have been gathered together by Atkinson in his book, *Motives in Fantasy, Action and Society* (1). Many of the findings reported in these books and elsewhere on *n* achievement were provocative and intriguing. And the concerted effort by a number of psychologists to study one important motivational system was an encouraging one. In the main, however, these investigations were limited to subjects of high school age or older. The development of achievement

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[1] The conceptual formulation presented in this paper was developed as a part of a research project, "Parents as identification models and reinforcers of children's achievement development," supported in part by a special grant (M-2238) from the National Institute of Mental Health, United States Public Health Service.

[2] A shorter version of this paper was presented by the first author in a symposium, "Conceptual and Methodological Developments in Parent-Child Research," Midwestern Psychol. Ass., Chicago, May 8, 1959.

Child Develpm., 1960, 31, 787-797.

motivation and achievement behaviors in children was sometimes discussed, but little research has been carried out. Exceptions to this have been the studies of the sociologist, Bernard Rosen, investigating social class and parental behavior as determinants of preadolescent boys' achievement motivation (9), the dissertation by Marian Winterbottom, a student of McClelland's, on independence training and achievement motivation (11), a study by Kagan *et al.* on achievement motivation and intelligence test performance (5), and the project by Strodtbeck on family interactions, values, and achievement motivation reported in the recently published book, *Talent and Society* (8).

Child development research, on the other hand, has essentially ignored the problem of the development of achievement motivation. While other dispositional systems have been extensively studied, e.g., dependency and aggression, research regarding children's achievement behavior has been primarily limited to studies of abilities. Neither achievement motivation nor achievement behaviors *per se* have been investigated in any detail.

It is evident that all children, as they emerge from the initial helplessness of infancy, gradually develop motivations and skills to achieve an ever-increasing variety of goals. During early childhood, as a child's capacities mature and new learning situations are faced, the need for achievement emerges from genetically prior need systems. By nursery school age or early grade school age, individual differences are apparent in the strength of children's achievement needs, in the achievement standards they have incorporated, and in the techniques they have acquired to attain various achievement goals. What are the determinants of these differences? This is the basic question to which we have addressed our current research. When we initially became interested in this problem, we instigated three lines of attack. First, several small, preliminary studies were conducted to elucidate certain antecedents and correlates of selected aspects of young children's achievement behavior (2, 3). Second, on the basis of these studies, and from other observations and interviews of parents and children, an attempt was made to develop a more rigorous conceptualization of children's achievement behavior than we had been able to do previously. Finally, with the support of a U. S. Public Health grant, we are currently conducting a larger study of parents as identification models and reinforcers of young children's achievement development. Limitations of time preclude the discussion of each of these three approaches in detail. The remainder of this discussion, therefore, will be restricted to the problem of conceptualizing children's achievement behavior.

What is achievement behavior? For research purposes, what behavioral referents should or should not be included under this rubric? In this respect, it is essential that children's achievement behaviors be clearly delineated from their other social behaviors and that specific criteria be established for doing so. Three criteria were decided on which, in combination, seemed to distinguish achievement behaviors from other goal-directed be-

haviors. These criteria were: (a) the inferred goal of the behavior, (b) the unique characteristic of the behavior involved, and (c) the nature of the situations in which the behavior occurred. The *goal* of achievement behavior was, as we saw it, the attainment of approval and the avoidance of disapproval. Such approval or disapproval could be self-imposed or come from other persons. The inferred goal of achievement behavior was, thus, a distinctive class of reinforcements, i.e., approval-disapproval or symbols representing this. Approval might be verbal, or expressed symbolically by prizes or rewards. Similarly, disapproval might take the form of direct verbal criticism or be expressed through indirect means such as the withdrawal of privileges or the withholding of prizes. The second defining characteristic of achievement behavior was, we thought, the unique attribute of the behavior itself, *competence of performance*. Finally, the major requisite of achievement situations, it seemed, was that they entailed tasks or activities in which a *standard of excellence* might be applied to the competence of the behavior exhibited. This analysis suggested the following definition of achievement behavior: "Achievement behavior is behavior directed toward the attainment of approval or the avoidance of disapproval (the goal) for competence of performance (characteristic of the behavior) in situations where standards of excellence are applicable (nature of the situation)."

This proposed definition helps to denote and delimit behaviors to be included under the rubric of achievement behavior, and for most purposes we are employing it in our current research. From a developmental point of view, however, such a definition may be too limited to encompass all rudimentary aspects of children's achievement development. For example, in our current research, the parents studied behave in ways which indicate that they conceive of their children's achievement behavior more broadly than the suggested definition allows. These parents, mothers and fathers of early grade school-age children, have been interviewed to assess their attitudes and reported reactions toward their children's achievement behaviors. Often, when the interviewers have asked the parents to give critical incident reports of their children's achievement behaviors and their reactions to them, the parents have reported responding to attributes of their children's behavior other than competence of performance. For many of these parents, competence of performance is only one aspect of achievement behavior toward which they express approval or disapproval. Other attributes were also frequently mentioned. One of these was general interest; that is, the parents saw certain kinds of activities as potential achievement situations for their children and, dependent on their desires for the child, rewarded or punished the interest the child expressed in these activities. Second, the parents also frequently reacted to their children's participation or nonparticipation. Thus often, even before the child developed any competence in an achievement area to which the parent might react, the parent responded to whether or not the child was interested in and/or participated

in various achievement activities. These parental reactions do not negate the usefulness of our original definition of achievement behavior, but do suggest, from a developmental point of view, that parents may see certain activities as potential achievement experiences for their children and react accordingly before the child has developed any appreciable degree of competence which may be approved of or criticized.

In our preliminary research, as the children's achievement behaviors were observed and as these behaviors were discussed with their parents, it became apparent that, even by nursery school age, achievement could not be conceived of as a global, unitary variable as has usually been done in most studies of achievement motivation to date. Research by McClelland and his colleagues, for example, has implicitly employed the concept of *n* achievement as though achievement motivation, regardless of the area in which it was evoked, was invariant. Contrary to this, our observations suggested that achievement motivation, achievement standards, achievement expectations, and achievement efforts may vary markedly from one achievement area to another. One child (or adult, for that matter) may set high standards for his achievement performance in one area such as intellectual achievement, but hold relatively low standards for, say, his physical skills performance. Similarly, a child may highly value successful attainments in the social skills achievement area but be essentially unconcerned about the possibilities of reward or success in mechanical skills activities. As a result of this general observation, several achievement areas have been delineated in our current research. These include: (a) intellectual achievement, (b) physical skills achievement, (c) artistic-creative achievement, and (d) mechanical skills achievement. An important additional area which we are not currently studying is that of social skills achievement. Our research will attempt to investigate the generality or specificity of achievement motivation and behaviors *across* achievement areas. Such an approach poses several interesting developmental questions. For example, do children's achievement values, standards, and expectations become more or less specific with age? Also, what determines the development of individual differences in the generality-specificity of such achievement behaviors in children?

The discussion so far has been concerned with the definition of achievement behavior and with the necessity and potential utility of delineating specific areas in which achievement behavior may occur. Now let us turn to achievement behaviors themselves and to concepts which may be predictive of these behaviors. As we observed young children in free-play situations, it was apparent that a number of discrete achievement behaviors could be identified. Two such behaviors were those of achievement choices and task persistence. In the remainder of this discussion, these behaviors will be used as examples, and concepts which might be predictive of these and other achievement behaviors will be discussed. In respect to the children's ***achievement choices,*** the children exhibited consistent differences in the frequency with which they did or did not choose to participate in

achievement activities. Also, when the children made choices between achievement activities, certain children usually selected specific areas of participation such as intellectual achievement activities, while other children consistently preferred, say, physical skills or artistic activities. A second achievement behavior where marked individual differences were noted was that of *task persistence*. Some children were observed characteristically to strive and persist in their attempts to develop achievement skills and attain achievement goals, while the efforts displayed by other children in achievement activities were sporadic and desultory. Difficult achievement tasks seemed to spur some children on to greater striving, while others readily "left the field" in such situations.

What concepts might be employed to predict individual differences in these and other achievement behaviors of children? Following the precedent set by previous research on achievement motivation with adult subjects, some general index of achievement motivation might be obtained and used as a predictor variable. For example, following McClelland, the children might be presented TAT-like stimuli, and a measure of their *n* achievement be derived from their projective responses. This index of achievement motivation might predict beyond chance, for example, both the children's achievement choices and task persistence. Additional concepts and measures, however, might increase the power of such predictions, as well as elucidating relationships among these concepts. An attempt has been made to do this in our current research. Three concepts have been employed for this purpose: (a) attainment value, (b) achievement standards, and (c) achievement expectancies. Each of these will be discussed in turn.

All achievement behavior is goal-directed. As suggested, the basic goal of achievement behavior is the attainment of approval and the avoidance of disapproval. Approval and disapproval constitute the defining cues for competence of performance and are the potential reinforcements for achievement behaviors. Such reinforcements should affect the importance that children attach to various achievement goals. The goals of achievement behaviors which have been rewarded should, in time, acquire secondary reward value, i.e., children so rewarded will come to anticipate that the attainment of such goals will lead to strong reward while the attainment of other goals may be less rewarding. As we observed young children, it was evident that some of them did attach importance, say, to intellectual attainments but placed little value on physical prowess, while other children seemed to value neither of these, for example, but strongly desired approval for achievement in the social skills area. In other words, these children appeared to have acquired different attainment values for various achievement areas. *Attainment value* was defined as "the importance that an individual attaches to the attainment of approval and the avoidance of disapproval regarding the competence of his performance in a given achievement area." The similarity of this concept to more general constructs such as Lewin's "valence" (6) and Rotter's concept of "need value" may be noted

(10).[3] The concept of attainment value should be useful for predicting individual differences in various achievement behaviors of children such as their achievement choice behavior and their task persistence. For example, children who hold high attainment values for a given area of achievement should more frequently select this area for participation than areas in which they attach lesser attainment value to potential rewards. Also, other things constant, children who have high attainment values in a given area should persist more in the face of difficulties than children for whom achievement rewards in this area have little value.

A second concept which seems potentially useful for predicting children's achievement behaviors is that of *achievement standards.* Competence of performance must always be judged by some standard of excellence. Few achievement standards, however, are invariant; more often, individuals differ in respect to the standards they apply to their own performance and/or to the performance of others. Thus, a person's subjective standards may or may not coincide with objective or socially-defined standards. Two children, for example, may both receive B's in school courses (an external definition of degree of academic competence); yet, depending on each child's personal standards, one child may subjectively experience failure and dissatisfaction with his performance, while a second child will feel he has been successful and will be proud of his accomplishments. An achievement standard was defined as "a scale of excellence against which the competence of an individual's achievement efforts may be evaluated."

Achievement standards appear to have a number of identifiable parameters. However, only one of these, height of standards, has received any attention to date. Our observations of children's achievement behaviors suggest that a number of additional parameters are evident. These include, among others, breadth, form, stability, and source. Since none of these latter parameters has been investigated as either independent or dependent variables in achievement research, a brief discussion of each seems warranted. First, returning to *height of standards,* this parameter was defined in our research as "the level of competence of achievement behavior necessary to attain approval." This definition suggests that an individual's achievement standards contain a cutting point on a scale of performance proficiency above which approval is expected and below which disapproval is anticipated. One personality theorist, Rotter, employs the concept of "minimal goal" to designate this cutting point (10). When an individual's minimal goals are high, more competent performance is necessary to obtain approval than when his minimal goals are low. Or put another way, given

[3] The present conceptualization of achievement behavior was strongly influenced by these two theorists, to whom we acknowledge special indebtedness. The level of aspiration paradigm developed by Lewin and his students seems particularly appropriate, in its broadest sense, for the conceptualization and measurement of many aspects of achievement behavior. Several constructs from Rotter's social learning theory of personality have been employed, both directly and in modified form, in the present conceptualization.

two children with equal performance proficiency whose behavior elicits similar external reinforcements, with one child who has high minimal goals while the other does not, the former is more likely to experience subjective failure than the latter.

The *form of achievement standards* may also vary. While all achievement standards can be characterized as scales on which a cutting point of approval-disapproval may be located, the form of these scales may differ in varying situations and for different individuals. Some standards of achievement performance approximate cardinal scales, others appear to be essentially ordinal scales, while still others are nominal dichotomies. These formal differences are observable in both external or socially-defined achievement standards and in the subjective achievement standards held by specific persons. Examples of different forms of external standards are readily found in the area of intellectual achievement. Evaluations of academic competence may be communicated in terms of numerical scores (cardinal scaling), or by class rank (ordinal scaling), or by reports of "satisfactory-unsatisfactory" or "pass-fail" (nominal dichotomies). Individuals, too, may develop subjective achievement standards with similar variations in form. Some persons appear to evaluate the competence of their performance in terms of finely graded subjective standards. They respond to small increments of proficiency above their minimal goal with increased increments of self-approval, and increasing increments of self-disapproval are evident as their proficiency gradually drops below their minimal goal. At the opposite extreme, other persons characteristically react to their achievement efforts in an "all-or-none" fashion. They, too, have minimal goals distinguishing competent from incompetent performance. However, they do not appear to differentiate proficiency beyond that of competence; subjectively they either succeed or they fail. From a developmental point of view, young children's achievement standards may change with age from crude dichotomous ones to ordinal standards and, in some instances, may even come to approximate cardinal ones as children become older. Whether this is or is not so must be determined in future research.

A third parameter of achievement standards is breadth. *Breadth of standards* refers to the degree that achievement standards may be specific to classes of achievement behavior and areas of achievement experience *or* generalize across such behaviors and areas. Some children seem to apply similar standards to their achievement behavior regardless of the situation or achievement area involved. This is particularly characteristic of certain children with very high standards who, regardless of the area they participate in, are satisfied only with exceptionally proficient performances. On the other hand, even by nursery school age, many other children appear to be developing standards which are specific to, and vary with, classes of achievement behaviors and achievement areas.

A fourth identifiable dimension of achievement standards is that of stability. *Stability of standards* denotes the degree to which an individual's

standards are vulnerable to change as a function of the reactions of other persons or of new experiences. Following suggestions from level of aspiration studies, achievement standards, like level of aspiration expectations, may change as a function of specific success and failure experiences. And, like level of aspiration expectations, the stability of standards may differ for various individuals. Some children, for example, may more readily change their standards following success and approval than after failure, while the opposite may be true of other children. Also, children may differ in respect to the direction that they most readily change their standards, with some more likely to respond by raising their standards while others more readily lower their standards. With the exception of one or two studies, such as that by Jessor (4) with college students, the effect of reinforcements on the stability of achievement standards has not been studied. Such experiments with young children, however, are possible and should be conducted.

A fifth parameter of achievement standards is the present *source of achievement standards*. The standards which children employ to evaluate their achievement proficiency may be primarily internal or external. Some children (and adults, for that matter) appear to evaluate and react to their achievement efforts almost exclusively on the basis of their own subjective achievement standards. These persons are less apt to apply the achievement standards of others to their own performance and less often define the competence of their behavior on the basis of approval or criticism from others. Such individuals might be said to hold *autonomous achievement standards*. In contrast, other children and adults characteristically look to other persons to define the competence of their performance; their standards, then, mirror or reflect the standards or reactions of other persons and might be designated *reflective achievement standards*. Developmentally, it might be presumed that children who have developed autonomous achievement standards have more readily incorporated the achievement standards which significant-others such as parents have held for them and have come to accept these standards as their own. Future studies of achievement development may find that, as with children's moral standards, differences exist in the degree that young children do or do not incorporate the achievement standards of significant-others. Our preliminary observations suggest that some children may strongly incorporate parental achievement standards by early grade school age. These incorporated standards often appear to have become completely internalized, with the children relying heavily on them to evaluate their own achievement performances. Other children at this age, in contrast, do not seem to have developed internalized achievement standards to any major degree; their evaluations of their achievement efforts are characteristically reflective, i.e., they are primarily contingent on the reactions of other persons. How these differences eventuate remains a challenging question for future child development research.

A third construct, in addition to those of attainment value and achievement standards, may be useful for elucidating and predicting children's

achievement behaviors. This concept has been designated *achievement expectancy*. A child's achievement behaviors are affected, it seems, not only by the importance he attaches to his goals (attainment value) and the standards he employs to evaluate his performance, but also by the expectations he holds regarding the probable success of his achievement efforts. Achievement expectancy was defined as "the probability held by the individual that his achievement efforts will lead to goal attainment." Past level of aspiration research has investigated stated achievement expectations as a dependent variable in great detail. However, our major interest in the concept of achievement expectancy at the moment is the possibility of employing it in a combination with the previously-mentioned constructs of "attainment value" and "achievement standards" to predict to achievement behaviors. The use of the concept of achievement expectancy, when employed either singly or in combination with these other constructs, may increase the power of predictions to specific achievement behaviors such as "task persistence." For example, children who have strong expectations of achievement failure should exhibit low task persistence. They are more likely to cease their efforts and "leave the field" in a difficult achievement situation than are children who anticipate that their achievement efforts will lead to goal attainment.

To summarize, predictions to specific aspects of children's achievement behavior may be made from one general concept such as "achievement motivation" as has characteristically been done in past achievement research with adults. However, it is the thesis of this discussion that other concepts may be useful and necessary. Three such constructs—attainment value, achievement standards, and achievement expectancy—have been suggested as possibilities. Using the achievement behavior of task persistence as an example, a number of predictions might be made. First, strength of attainment values held by children should be positively correlated with their task persistence. The more important the area is to the child, the more persistent will be his efforts to obtain rewards in this area. Second, as previously discussed, children's expectations of success should be positively associated with task persistence. Third, as far as the interactive predictive value of these two variables is concerned, attainment value should enhance the correlation of expectancy and task persistence. That is, the more important the outcome is to a given child, the more likely he is to behave in accordance with his generalized expectations, whether they be of success or of failure. A child who holds strong expectations of success should increase his efforts when he also highly values the reinforcements associated with success in the area under consideration. In contrast, a child who has expectations of failure but also has high attainment values should be in a strong conflict situation and, therefore, be likely to "leave the field." Finally, the use of the concept, height of achievement standards, provides possible predictions beyond those generated from the concepts of "attainment value" and "achievement expectation." For example, while expectations are concerned

with the probability that objective reinforcements may occur, the actual occurrence of these reinforcements may differentially affect various individuals dependent on their achievement standards. In other words, two children who hold the same expectations for success, and who also actually obtain the same external rewards for their efforts, may differ in their subjective reactions to these reinforcements. In this case, the external reinforcements are the same for both children; their internal reinforcements differ. Here, achievement standards are relevant. While expectations and external reinforcements may be the same, a child with high achievement standards will not find the reinforcements eventuating from a performance at lower levels of competence as rewarding as will a child with low achievement standards. Other things being constant, the former child, over time, should more readily despair and leave the field while the latter child will evidence more task persistence. On the other hand, children with very low achievement standards may also exhibit little task persistence but for different reasons. They may, under certain conditions, be satisfied with incomplete or relatively poor performance and therefore terminate their efforts while other children continue to persist. Thus, there is the possibility that height of children's achievement standards may bear a curvilinear relationship to their task persistence.

In conclusion, in new areas of child development research such as achievement development, a hypothetico-deductive approach to research problems is frequently impossible. In such new areas, too little research has been done to produce a comprehensive body of knowledge from which new hypotheses might be generated. At first, inductive research is necessary. However, research need not continue to be limited exclusively to inductive studies. In our own research, we have attempted to move beyond preliminary, inductive studies of children's achievement behavior by constructing a conceptual system conducive to the formulation of testable hypotheses and to the prediction of specific aspects of children's achievement behavior from multiple constructs. This conceptualization and illustrative hypotheses have been discussed. Its ultimate utility awaits the test of future research.

References

1. Atkinson, J. W. (Ed.) *Motives in fantasy, action and society.* New York: Van Nostrand, 1958.

2. Crandall, V. J., Preston, Anne, & Rabson, Alice. Maternal reactions and the development of independence and achievement behavior in young children. *Child Develpm.*, 1960, 31, 243-251.

3. Crandall, V. J., & Rabson, Alice. Children's repetition choices in an intellectual achievement situation following success and failure. *J. genet. Psychol.*, 1960, 97, 161-168.

4. Jessor, R. The generalization of expectancies. *J. abnorm. soc. Psychol.*, 1954, 49, 196-200.

5. Kagan, J., Sontag, L. W., Baker, C. T., & Nelson, Virginia. Personality and IQ change. *J. abnorm. soc. Psychol.*, 1958, 56, 261-266.

6. Lewin, K. *A dynamic theory of personality.* New York: McGraw-Hill, 1935.

7. McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. *The achievement motive.* New York: Appleton-Century-Crofts, 1953.

8. McClelland, D. C., Baldwin, A. L., Bronfenbrenner, U., & Strodtbeck, F. L. *Talent and society.* Princeton, New Jersey: Van Nostrand, 1958.

9. Rosen, B. C. The achievement syndrome: a psychocultural dimension of social stratification. In J. W. Atkinson (Ed.), *Motives in fantasy, action and society.* New York: Van Nostrand, 1958. Pp. 495-508.

10. Rotter, J. B. *Social learning and clinical psychology.* New York: Prentice-Hall, 1954.

11. Winterbottom, Marian. The relation of need for achievement in learning experiences in independence and mastery. In J. W. Atkinson (Ed.), *Motives in fantasy, action and society.* New York: Van Nostrand, 1958. Pp. 453-478.

INFLUENCE TECHNIQUES: A CONCEPT USED TO STUDY PARENTAL BEHAVIORS[1,2]

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One of the most intriguing, fascinating, perplexing, and controversial problems in the study of parent-child behavior is that of parental discipline or control. There seems to be no question among experts and parents that discipline or control is of fundamental significance for the child, in the short-term and in the long-run.

The study upon which the discussion today is based deals directly with the topic of parental control. The major focus of the project is to determine the types of influence techniques employed by parents to control or to modify the ongoing behavior of their children and to assess the psychological effect of such practices. Since influence techniques are overt behavioral acts, the underlying aim here then is to show the psychological impact of overt parental behaviors. The focus in this paper, however, will be on the concept of influence technique, its classification, and methodological problems in its measurement.

Before proceeding to a direct examination of the influence technique material, I should like to address myself to some of the issues in parent-child research which have, in varying ways, influenced our own thinking and development of this project.

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Ironically, agreement regarding the significance of parental control of children has not led to systematic examination or systematic conceptualization. One of the reasons may be that we have not come to terms with the level of discourse to use in categorization of parental behaviors. Are we to stay on the manifest level, using categories which denote the essential elements identifiable within a behavioral act; or are we to stick to the underlying motivations, feelings, or attitudes reflected in the act? To be sure, the latter case involves greater inference and greater opportunity for error. I am not proposing that one or the other is of more or less import. What I am proposing is, given these two levels of discourse, let us be consistent within classification systems and not confuse means-end relationships with behavioral motives or, specifically, the parental act with the effect of the act on the child. A good illustration of the latter comes from Redl and Wineman, who are the originators of the term "influence technique." They have a category called Decontamination thru Humor. This contaminates the psychological effect with the act. Humor can be a behavioral act which decontaminates, hypothetically at least, but this should be differentiated within the logical analysis of the category. The level of discourse has yet to be adequately and consistently defined in this area of research.

Related to this question is the fruitless and time-wasting argument regarding the relative importance of overt vs. covert parental behavior. For example, in this case are the influence techniques of the parent more important than the parent's attitudes and feelings? This is reminiscent of the heredity-environment question. That was resolved by changing the *or* to an *and*. No doubt, the controversy on the overt-covert issue can be settled just as simply.

Not only are we faced with confusion of the conceptual level, but we also tend to confuse the *how* and *when* certain childrearing practices are employed. For example, in studies using severity of weaning as an index, time is frequently used as the criterion of severity, not *how* the child was weaned. Thus, a child could be punitively weaned at twelve months or gently weaned at six months. It is important to establish the time as such, but it is crucial to enlarge the context to include *how* it was done as well.

In developing a research problem, we also have to come to grips with the question of theory. There are strong emphases today on the need for theory-building. There is no doubt that the development of adequate theory enhances the value and the meaningfulness—and, thus, the scientific contribution—of the research. As in other research, parent-child studies stem from different theoretical points of view which influence the entire research operation, e.g., the problem selected for study, the methodology employed, and the kinds of data obtained.

Time does not permit a full development of the issues involved in the role and use of theory in parent-child studies. But let me just mention that, logistically, the research worker can move directly out of a given theoretical position, e.g., reinforcement theory, and proceed to do his study. Yet it is

interesting to note that relatively few parent-child studies explicitly test the theoretically derived hypotheses. Reinforcement theory, for example, does not actually get tested in most parent-child research, especially those employing naturalistic data, i.e., interviews, observations of child behavior, etc. The degree to which particular behaviors are reinforced, the intensity and the frequency of reinforcement, cannot be specified with the degree of precision required for adequate verification of hypotheses.

Rather than arbitrarily—or because of personal commitment—set up our problem from a given theoretical position, we began to build our own theory. Our commitment was to the need for theory—not to a particular one. Thus, we developed it as explicitly as we could by analysis of the phenomenon under study. To be sure, concepts and findings from other research were brought to bear. Knowledge of theoretical developments in the area was certainly employed. All this, however, was used to elucidate a set of relations that were predicted to exist between influence technique behavior and a variety of child variables. The dependent variables (child behavior and traits) were selected on the basis of presumed psychological relevance to the conception of influence techniques. Further, we tried to explain the reason for the predictions, using, as needed, the relevant psychological mechanisms, concepts, and facts. Thus, we kept our theory building continually related to our problem. This may be "low level" theory (but how many psychological theories can be identified as "high level," whatever that is?)—exploratory in nature and directly relevant to the phenomenon of influence technique.

One of the major problems in much research in the parent-child field is the phenomenon of alternative explanation. Frequently, the same finding can be explained reasonably well by two or more theories. This is one problem that was ever present and plaguing. Again time does not permit discussion of this. I do not want to imply, however, that we solved that problem. We are still plagued with it. This, perhaps, is one of the key theoretical problems in our entire field.

These are some of the considerations that guided us explicitly in our work. No doubt, many other factors implicitly influenced us, too, but we are not able to specify these.

Returning now to the concept of influence technique, let me show, albeit briefly, how we proceeded. The need to develop a consistent conceptual scheme by which the diverse identifiable techniques could be organized was paramount.

Since an influence technique is an intervention in an ongoing stream of behavior, we used this as the cornerstone of our analysis of the potential effect such a technique would have on the child and in our analysis of the potential antecedents such techniques would have from the history of the parent (4, 5, 6). Thus, we began to develop logically consistent theoretical predictions stemming from the basic character of the influence technique. Further, we began to think of the consequences and the antecedents in rela-

tion to the content of the technique as well as the presumed effect such content would have on the child.

For today, however, the purpose of this symposium is to discuss the methodological problems around the influence technique itself, and this will be our primary point of departure.

Thinking, then, of the influence technique in its context and looking for a conceptual thread that would sew up the system, we decided that the concept that would be most useful—and have the greatest potential for predictive power—would be that of *power* itself. We were studying parents and their preschool children. In this relationship, in particular, we saw the power dimension as a potent factor and came to the conclusion that power assertion, i.e., the overt expression of power, is a key concept. Why power? Parents are in a position of power in the parent-child situation not only because of physical size and experience but because they are the controllers and suppliers of material and psychological goods and services. The social responsibility of parents is that of an authority or power figure. Influence that one has over another is a function of power. The people who are influential are the people who are most powerful. This simple type of role analysis merely described the potential that resides in a situation. Whether or not the potential is manifest becomes a function of various factors, e.g., the ability and willingness of the individual, psychologically and socially, to use his power; the social support for the use of power; and the experiential factor of practicality, as well as the feasibility, of using one's power. The parent is in a situation where he may or may not exert the power, and the decision to do so is affected by the types of factors mentioned above. Nevertheless, because of the fact that inherent in the social role of the parent is the potential to assert power, we concluded that this was not only a reasonable but a realistic organizational concept.

Since power assertiveness can vary in intensity, three criteria were developed to determine the degree of power assertiveness in an influence technique: (a) the degree of choice the child has to comply or not comply with the message in the technique, (b) the arbitrariness of the content in the message presented, and (c) the pressure to comply.

Thus, when no choice is allowed in the message and high arbitrariness of content and high pressure are all manifest in the technique, these techniques would be high on the power assertive dimension. And the converse: when choice is given the child about compliance, when little or no arbitrariness exists, and where there is no pressure to comply, this would be the other end, or the nonpower assertive aspect.

From these criteria five major influence technique categories were developed. Of these, three types of power assertiveness resulted from the criterion of no choice regarding compliance, differences occurring as a function of the decrease in arbitrariness and pressure for compliance. The three are as follows:

Power assertive unqualified: where no choice regarding compliance is contained in the message, where arbitrariness and pressure to comply is maximum. This technique can be either physical (e.g., yanking, pulling, restraining) or verbal (e.g., "Sit down," "Do not do that.")

Power assertion with reason: where the no-choice aspect is still present but where arbitrariness regarding demands is reduced by the parent's use of justifications or explanations (e.g., "Sit down and eat now so we can go out.")

Power assertion with cushion: where again the power assertive component is present, but this time tempered by the parent's concern for the child's welfare, feelings, or general psychological state (e.g., "You can't go to the movies today but you can next week.")

The commonality among these, then, is the no-choice criterion; and since there is variation in the other two criteria—of arbitrariness and pressure—it is assumed that these show a decrease in the power assertiveness dimension.

Techniques which manifest choice regarding compliance, and therefore are lower on the power assertive dimension, are *persuasions* and *suggestions*.

Persuasions are techniques which give the child choice whether or not to comply, provide him with the information regarding implications of the behavior in question, and have the quality of appealing to some aspect of his psyche (e.g., conscience, self-interest, etc. "If you look for it you will find it" and "If you eat your Wheaties you'll grow up to be strong.") Note the reduction in arbitrariness and pressure, the latter still there, however, but with an appeal. But the statement is a conditional one and does not indicate that the child must comply.

Suggestions are techniques which indicate the direction for the child's behavior to take, with practically no pressure to comply and no arbitrariness (e.g., "Would you like to go?" "Would you want Jimmy to come over and play with you?")

Within each of these major categories are a variety of subcategories and subsubcategories. For example, under Power Assertion Unqualified there are five major subcategories and 14 additional subsubcategories. For each of the five technique categories we have an equivalent number of minor categories which tend to get down to the specific—and at times highly idiosyncratic—techniques used by some parents. Nevertheless, there is a consistency by which these subcategories fit into the larger rubrics.

Numerous combinations of these are also possible. For example, we find cushioning techniques, i.e., those techniques which tend to meet the child's needs or concern themselves with his welfare or feeling, occurring without the use of power. Affection-giving and parent participation is another technique which can operate independently of power assertion or any of the five techniques mentioned above. Partial closure, i.e., allowing partial or whole task completion, can be treated as a separate as well as within the

context above. We have treated these statistically at times as separate and at times as part of the total gestalt in which the technique fits.

The influence technique is part of a social interaction unit we have labelled *influence interaction sequence*. The model used is as follows: A discrepancy exists between the parent's wish regarding the behavior of the child and the child's behavior. This divergence results in the parent invoking an influence technique to resolve the situation. The child may or may not comply to the particular technique. The parent may elect to leave well enough alone or to follow through in the face of the child's noncompliance and keep trying. If and when the situation is resolved, or if it just stops with the parent giving up, we have our unit of social interaction: an *influence interaction sequence*.

The primary data in this study, the influence techniques used by parents, were obtained through an interview which I should now like to describe and then pose some of the methodological problems encountered. The interview, a behavior day type, was structured so that the parent was asked to give a chronological account of all interactions occurring between the parent and the child during the 24 hours preceding the interview (1). The task for the parent was to act as a participant observer, describing in detail actions, conversations, locale, and reactions to interactions of himself and child. The interviewer probed to elicit omitted details and to keep the interview from tangential movement (1, 3, 5).

Whether interviews are better than observations is an empirical question. We wanted a wide range of parent-child interaction, the parent's rationale for his behavior, and the parent's feelings regarding the particular technique and its effect. These are all types of data that cannot be obtained by observation.

On the other hand, interviews pose inherent problems of validation, typicality, and reliability. Does the parent distort—deliberately or unconsciously? Is the day described by the parent typical? Forgetting minute details, deliberate holding-back, overemphasis are all possibilities.

Our confidence in the interview is based on the following rationale: (a) the requirement that parents try to relate specifics breaks up the recall gestalt into details; (b) the focus on behavioral interaction minimizes feelings and attitudes toward the child and hence reduces the threatening quality of interviews; and (c) probing for descriptive details of the situation enhances recall. The reading of these interviews indicates tremendous minute detail that fathers and mothers were able to recall (2).

The interviews were then put into chronological order, actually cutting out feelings and attitudes and so presenting the coder only material describing overt behavior at a particular place and time. Given this procedure for the use of parental data, the coding of the interviews focused on the manifest content of the parent's influence interaction.

One of the major problems here is the identification of the technique. You will recall that a technique is identified as an *attempt* to influence the

other. Actually, most of the time a technique can be identified easily since the manifest content contains directionality of the behavior. For example, "Johnny, please come here and help me," or "Johnny, stop playing with that hammer," contains a message indicating the direction that the child's behavior should follow.

However, difficulty in identification of techniques is encountered for the more subtle ones, such as environmental manipulation or using oneself as a prop, e.g., standing in a particular spot to prevent the child from moving in a certain direction. For verbal, gestural, or physical techniques, where the message indicating the direction the behavior is to take is clear, observations could be useful. For the subtle type, however, it seems essential to ask the parent what his intention was. At times this information had to be used to determine whether the behavior in question was a technique or not. Once this was decided, the coding was similar to more obvious ones.

Each aspect of the interaction sequence is coded. The divergence (e.g., routine, daily tasks involving child care such as eating, sleeping, dressing, etc.) is identified first. Then the technique is coded as to its major category and particular subcategories. Next the child's response is scored as compliant or noncompliant, with a coding for the specific emotional concomitant, e.g., neutral, objecting, etc. If the child complies, the influence interaction unit is concluded. If it goes on, then a similar analysis is made. We have identified the technique in its sequence. Is it the first, or is it a reaction to the child's noncompliance or subsequent noncompliance? Thus, we have specific categories of techniques denoted by time in relation to the sequence of parent-child interaction that occurred. Each influence technique category, e.g., power assertion, is also identified as to its place in the time sequence.

Analysis of the data has been done relating, e.g., power assertion alone as an initial technique with child variables and also power assertion as a technique in reaction to the child's noncompliance. We have also done a series of interparent technique comparisons which, by the way, indicate very little correlation between mother's and father's frequency of use of each influence category.

Just to show that it was not all in vain, we did find significant relations with many categories of influence techniques and child variables (3). These were in the predicted direction for initial techniques and for techniques used as reactions to noncompliance—the latter being the more sensitive. Our hunch is that this is so because there is probably greater conflict in the situation when the parent is responding to the child's noncompliance.

I should add that the major hypotheses testing the psychological effects of techniques were done using interview data, obtained separately from fathers and from mothers. The dependent variables, i.e., child variables, were obtained by categorizing observations of the child in a nursery school setting. Thus, the children's data are independent of the parental reports (5).

Such a paradigm as an influence interaction sequence is applicable to any social interaction in which it is possible and feasible for one individual to attempt to modify the behavior of another. Almost any adult-child interaction, irrespective of age, is a likely target for such an application. The model is potentially useful for any adult-adult interaction as well. It would be interesting to observe this phenomenon operating between spouses, for example. No doubt, influence techniques are employed in decision-making situations, such as the husband's wanting a sports car when the wife wants a station wagon. Imagine the persuasive techniques that would be employed!

A further inherent condition, of course, is that all such interactions potentially allow for the expression of power. Such a consideration extends the fruitfulness of the problem, for now we can examine this dimension, not solely in terms of "need," but in actual expression.

Further examination of the ecological, social, and psychological requirements for power expression is in order. Such an analysis will enable us to assess with greater accuracy the conditions necessary for power expression. Since power assertiveness is a variable that can function in various interaction situations, further study of it can help clarify the ingredients of interpersonal interactive situations. As we increase our knowledge of these ingredients, we should thereby increase our predictive power. We believe, therefore, that our conceptualization of influence techniques offers a wide range of possibilities.

References

1. Brown, L. L., & Sigel, I. E. Behavior day interviews in social casework. *Merrill-Palmer Quart.*, 1955, 1, 158-171.
2. Hoffman, M. L. An interview method for obtaining descriptions of parent-child interaction. *Merrill-Palmer Quart.*, 1957, 3, 76-83.
3. Hoffman, M. L. Power assertion by the parent and its impact on the child. *Child Develpm.*, 1960, 31, 129-143.
4. Sigel, I. E., & Hoffman, M. L. The predictive potential of projective tests for nonclinical populations. *J. proj. Tech.*, 1956, 20, 261-265.
5. Sigel, I. E., Hoffman, M. L., Dreyer, A., & Torgoff, I. Influence techniques used by parents to control the behavior of children: a case presentation. *Amer. J. Orthopsychiat.*, 1957, 27, 356-364.
6. Torgoff, I. Parental developmental timetable: some correlates of parental developmental expectancy. Paper read at *Amer. Psychol. Ass.*, September, 1958.

A CONCEPTUAL MODEL FOR ASSESSING PARENT-CHILD MOTIVATIONS [1,2]

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Psychologists have long subscribed to the hypothesis that at some level and in some manner there is a relationship between the behaviors and goals of parents and the behaviors and goals of their children. However, defining and measuring the nature of these relationships has proven to be an exceedingly complex problem. Possibly for that reason much research in this area has fallen short of providing definite answers concerning the nature of various parent-child relationships. More specifically, limitations of researches in this area have included: (a) lack of any systematic relationship between parent variables and child variables investigated—for instance, parental attitudes have been correlated with specific child behaviors and vice versa; (b) contamination of data in that both parent data and child data have been gathered by the same persons or gathered in a situation where both parent and child were present; and (c) lack of attention to the possibility of scaling or otherwise quantifying measures beyond the level of frequency counts and rated global impressions.

Bonnie Tyler, Janet Rafferty, and I have been engaged for four years in a parent-child research project in which we have attempted to deal sys-

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tematically with the complex problems and relationships in this area. We have set for ourselves certain criteria as a guide as we have focused on the task of assessing the goal-directed—or motivational—characteristics of parents and of their children. First of all, it has been our intent to assess parental motivations and child motivations on the same variables within an explicitly defined theoretical framework. Secondly it has been our goal to develop reliable, communicable methods for the independent assessment of parental motivations and child motivations. Thirdly, we have sought to develop quantified scoring procedures.

Nature of the Project

We are using as subjects the children enrolled in a preschool nursery in a university housing project and their parents and have available a new sample of approximately 15 families each year. Our specific problem is to assess the motivations of these parents and of their children and to determine parent-child interrelationships.

The theoretical framework we have found most useful for conceptualizing this task is that of Rotter's social learning theory of personality. Within that framework, motivation or *need* is viewed as an abstraction from the goal-directed nature of behavior. Goals are viewed as acquired primarily in relationship to people, so need abstractions are conceptualized as essentially social. Five relatively general need categories outlined in Rotter's book, *Social Learning and Clinical Psychology* (4), have been used as a comprehensive system for categorizing all of the behaviors studied. These needs, and their general definitions as cited by Rotter, are as follows:

> Recognition-Status: need to be considered competent or good in a professional, social, occupational, or play activity. Need to gain social or vocational position—that is, to be more skilled or better than others.
>
> Protection-Dependency: need to have another person or group of people prevent frustration or punishment and to provide for the satisfaction of other needs.
>
> Dominance: need to direct or control the actions of other people, including members of the family and friends. To have any action taken be that which he suggests.
>
> Independence: need to make own decisions, to rely on oneself, together with the need to develop skills for obtaining satisfactions directly without the mediation of other people.
>
> Love and Affection: need for acceptance and indication of liking by other individuals. In contrast to Recognition-Status, not concerned with social or professional position of friends, but seeks their warm regard (4, p. 132).

These need categories are the basic motivational dimensions with which we are working. Frequency counts of referents in each category serve as direct operational measures of the concept *Need Potential* which is defined as relative choice preference for a given group of need-oriented behaviors. This relative choice preference is viewed as a function of two independent

intervening variables, *Need Value* and *Freedom of Movement. Need Value* is defined as "the mean preference value of a set of functionally related reinforcements" (4, p. 189), and refers to choice preference for certain kinds of goals with probability of attaining those goals constant. *Freedom of Movement* is defined as "the mean expectancy (or probability) of obtaining positive satisfactions as a result of a set of related behaviors directed toward the accomplishment of a group of functionally related reinforcements" (4, p. 194). In other words, within the need category of Recognition-Status, for example, we are concerned with assessing for each parent and each child the relative importance of Recognition-Status reinforcements (i.e., his Recognition-Status Need Value) and the expectancy that his behaviors will lead to positive Recognition-Status reinforcements (i.e., his Recognition-Status Freedom of Movement). We are also concerned with the appropriate combination of these two variables to predict his actual relative choice preference (i.e., Need Potential) for Recognition-Status reinforcements. For both children and their parents, these variables, Need Potential, Need Value and Freedom of Movement, are utilized. From observations of children's behavior in nursery, assessment of these variables is made for the five need categories. In contrast, from interviews of parents, assessment of these variables is made for three need categories, Recognition-Status, Love and Affection, and Dominance. Information has been collected from parents regarding their childrearing motivations and their nonchildrearing (Life-in-General) motivations. However, at present, only childrearing motivation data have been analyzed and these contain no responses in the Independence and Protection-Dependency categories.

Methodological Procedures and Rationale

It has been our goal to *categorize* and *quantify* parent interview responses and preschool child behaviors on the same dimensions, while at the same time maintaining two independently operating research teams in order to prevent contamination of assessment of parent and child protocols. In order to accomplish these two goals, we have sought to provide explicit operational definitions for all concepts and construct scoring-by-example manuals for both sets of data using these definitions.

We have proceeded by having the parent data team and the child data team operate independently to categorize and scale the referents, or units, with which they were dealing and then check agreement among themselves and between teams at each step in this process. Final sortings were used as a basis for constructing three scoring-by-example manuals for rating, respectively, mothers' interview protocols, fathers' interview protocols, and child observation protocols. These manuals were then used for scoring the protocols of the 18 children and 36 parents whose responses had been used in building the manuals. In addition, they have been used for scoring protocols of another sample of 16 children and 32 parents.

Having outlined briefly the major dimensions of our conceptual framework and our general methodological approach, I would like now to consider in some detail how we proceeded with the task of constructing parallel operational definitions for parents and for their children, using as an example our work with the need variable Love and Affection. As I mentioned earlier, it has been defined in general terms as the "need for acceptance and indication of liking by other individuals. In contrast to Recognition-Status, not concerned with social or professional position of friends, but seeking their warm regard."

Our first task was to identify interview statements and child behaviors that seemed to fall best in this category, then to outline descriptive statements that would serve as guides for identifying other Love and Affection interview statements and child behaviors. To do this, interview statements were sorted independently by two teams of raters, and child behaviors were likewise sorted by two raters working independently. Then, disagreements among the two parent data teams were worked out, and disagreements between the two child raters were worked out. Finally, the parent teams worked out descriptive statements appropriate to this need, as did the child raters. The entire staff then met to iron out differences in interpretations of various behaviors. The final discussions led to agreement on the following definitions:

Parental Love and Affection statements, in part, included:

1. Those dealing with playing with the child, with shared activities, or with companionship with the child.
2. Those dealing with discussion of the child's welfare or happiness.

Child Love and Affection behaviors, in part, included:

1. Friendly overtures and congenial laughter.
2. Cooperative play, sharing, helping and sympathetic behavior.
3. Seeking affectional reassurance.

The next major goal was to differentiate Love and Affection Need Value (or importance) indicators from Love and Affection Freedom of Movement (or expectancy) indicators and from Love and Affection Need Potential (frequency) indicators. For the present data, the task seemed relatively straightforward. Statements by a parent concerning anticipation, dread, joy, unhappiness, success, failure, etc., were considered to be Expectancy statements, whereas statements of importance or preference were considered to be Need Value statements. Examples of Need Value statements are:

1. Statement of importance of some activity or interaction—for instance, the parent may state he doesn't play with the child unless the child insists.
2. Statements of concern as to whether child's behavior meets certain qualifications, measures up to certain standards, etc.—for instance, parent may wonder whether child is happy in nursery.
3. Failure to respond to a question along a need dimension structured by that question (in this instance, Love and Affection) and/or to respond

along some other need dimension to such a structured question—for instance, if a mother is asked the Love and Affection question, "Do you ever get a chance to play with your child?" and responds by discussing how important it is to teach the child certain skills, that parent gets a minimum rating on Love and Affection Need Value, as well as a higher rating in the need area discussed (in this instance, Recognition-Status).

This final point of scoring is based on a consideration of the *Situational* or stimulus variable. In other words, our reasoning is that the nature of the question is such that it maximizes the appropriateness of a Love and Affection response, i.e., it focuses on discussing play with the child. Since this parent ignores those cues and responds on another dimension, i.e., concern with teaching, it seems appropriate to give him a minimal Love and Affection Need Value score for his failure to respond to the cues maximized, as well as a considerably higher score on the dimension in which he does respond.

In dealing with the child data, the task was to provide a basis for similar inferences on these two dimensions of Need Value and Expectancy from records of observed behaviors rather than from verbal statements concerning motivations as was the case for parent data. Need Value scores were arrived at by assuming an inverse relationship between the degree of situational structure and the need importance required to elicit a response. That is, it was thought that only minimal need importance, i.e., Need Value, was required to elicit a Love and Affection behavior in a Love and Affection situation; consequently, a relatively low Love and Affection Need Value rating was given such a behavior. In contrast, if the Situation was not structured at all for Love and Affection, then Love and Affection would have to be very important for the child to exhibit such a behavior. These behaviors were consequently given high Love and Affection Need Value ratings. The constructive-defensive quality of the behavior was then used as an indicator of Freedom of Movement or Expectancy. That is, direct friendly overtures or unhesitating and enthusiastic affectional behaviors are thought to indicate high expectancy; tentative behaviors, abortive attempts to initiate friendly interactions, withdrawal, etc., are thought to indicate low expectancy or Freedom of Movement.

Scaling, or assigning numerical scores to various kinds of responses for both parent data and child data, was the next step indicated. The same procedures were followed as before in trying to arrive at comparable scales for parent data and child data. Let me outline how parental and child Love and Affection Need Value referents were quantified on the 7-point scale used. Although some of the interview questions and behavioral situations are not structured to elicit any particular response, it is easier to outline our approach by using the structured questions and structured behavioral situations as examples. In each instance a score of 7 is considered to be a high score, with a score of 1 a low score.

The following general patterns prevailed for scaling (as indicated in Table 1). A high Need Value rating of 6 or 7 is given as follows:

TABLE 1

RATING OF LOVE AND AFFECTION NEED VALUE IN PARENT AND CHILD DATA

Need Value Rating	PARENT INTERVIEW		CHILD OBSERVATIONS	
	Question Structure	*Nature of Response*	*Situational Structure*	*Nature of Behavior*
High (6–7)				
	Need other than Love & Affection	Emphatic, high preference, etc.	Maximal for need other than Love & Affection or minimal for all needs	Self-initiated Love & Affection response
Moderate (3–5)				
	Need other than Love & Affection	Minimal to moderate		
	Love & Affection	Moderate to strong	Maximal for Love & Affection	Love & Affection response
Low (1–2)				
	Love & Affection	Minimal response, or response in another direction	Maximal for Love & Affection	Rejection of structure, or choice of another direction

a. For parents, a strong statement of the importance or relative preference for Love and Affection concerns or activities in response to a question structured for *some need other* than Love and Affection. For instance, in response to the Dominance question concerning whether the child is boss at home, the parent who responds by indicating they center their life around the child because it's important to them to consider the child's wishes gets a high Love and Affection Need Value rating.[3]

b. Similarly for children, by initiating an affection-seeking behavior in a situation which is maximally structured for some other need than Love and Affection, a high Need Value rating can be obtained. For instance, a child being observed has a box of stick-men; another child reaches across the table and takes some which she starts to line up in a row; if the child under observation then begins to help her, instead of grabbing for his "property," he is given a high Love and Affection Need Value rating. In other words, the child who grabs the stick-men has structured the situation for Dominance; the fact the observed child responds in a friendly way is under the circumstances considered to indicate high Love and Affection Need Value.[3]

[3] It should be noted that, in such an instance, the parent (or child) also gets the lowest possible Dominance Need Value rating (i.e., a rating of 1) for not responding to the maximal Dominance structuring of the question (or behavioral situation). This principle of scoring is discussed also in outlining the conditions under which a low Need Value score is assigned. The fact of double scoring is pointed out here specifically for purposes of clarification.

A moderate Need Value rating of 3, 4, or 5 is given as follows:

a. For parents, weak to moderate Love and Affection importance statements to a question structured for some need other than Love and Affection or moderate to strong Love and Affection statements in response to a Love and Affection structured question receive a moderate rating. For instance, a parent may indicate in response to a Love and Affection question that an affectional relationship has some importance to her, but so has the task of keeping the house clean, so compromises are made.

b. For children, moderate ratings are given for affection-seeking responses in maximally structured affection situations. For instance, a child is approached by a second one who offers to play with him. If the first child agrees and joins in cooperative play, then he is given a rating in this range.

A low Need Value rating of 1 and 2 is given as follows:

a. For parents, such a rating is given statements indicating the minimal importance of a Love and Affection relationship with a child or statements rejecting such a relationship as unimportant in a question which is structured for Love and Affection. For instance, such a score is given to the parent who says he has no time to play with his child when asked or who replies that the important thing is not play, but control.

b. For children, ratings of 1 and 2 are given for rejecting a maximal loading for affection, or for choice of another direction in such a situation. For instance, if a child offers to play with a second child and the second child does not respond or refuses, the second child gets a rating of 2 on Love and Affection Need Value. If the second child responds in another direction, for instance by knocking down the friendly initiator, then he gets a rating of 1 for Love and Affection Need Value.

As you may have noted by now, our approach to developing parallel measures of parental and child data has required the systematic quantification of the environmental context (or Situation) as an aid to assessing the meaning of behaviors that occur in the naturalistic observation context of the preschool and in the variable-stimulus context of the parent interview. Although psychologists have at times concerned themselves with the importance of the stimulus or environmental context in studying behavior, yet to our knowledge the present project is unique in the systematic attention we have given to the stimulus variable in developing these parallel measurement techniques. It is not possible here to outline in detail how Situational structures were determined; in general, they were arrived at by consideration of cultural factors, by the general nature of the responses of our reference sample, and by discussions among the research teams.

Findings, Summary, and Implications

By way of summary, I think our study is different from most recent research programs in that we have not achieved a major "break through" into the great tomorrow. In fact, it is possible that many areas of psycho-

logical research will be relatively unchanged by our efforts. However, let me outline briefly our results to date and their implications. First, the scoring manuals developed have yielded highly reliable scores with median *r*s near .80 for two distinct parent and child populations. Further, these reliabilities have held up when the scoring manuals have been used by competent psychologists with no experience with these manuals or knowledge of the subjects. In addition, the variables used have been found to be independent, although there is some cross-need generality of Freedom of Movement (Expectancy) for mothers and children. It would seem the conclusion is warranted that the approach and concepts used do yield a highly communicable, i.e., reliable, set of measuring instruments for assessing parent and child motivations and a reasonably independent set of motivational measures.

With regard to parent-child relationships or what one might charitably choose to call "validity," our results have the same characteristics of most current research in psychology. That is, in part they are encouraging, in part they are confusing, and in part they are disheartening. Nevertheless, they do seem to offer a somewhat better general level of predictability than have previous researches in this area. For instance, parent-child Recognition-Status Freedom of Movement (Expectancy) correlations are in the .70s. Over-all, it would seem these results support the desirability of using a consistent theoretical framework, of independently collecting parent and child data, of operationally defining the motivational variables used, and of scaling parent and child data in a parallel fashion.

The need for further research hardly needs stating. However, it would seem worthwhile to focus on one specific point, namely, the need for further investigations of the relationship to observed behavior of the stimulus or environmental context. Substantial advances in methodological sophistication and level of predictability in personality research seem definitely limited by lack of knowledge concerning the influence of situational factors in behavior.

References

1. Baldwin, A., Kalhorn, J., & Breese, F. Patterns of parental behavior. *Psychol. Monogr.*, 1945, 58, No. 3.
2. Brody, Sylvia. *Patterns of mothering.* New York: International Universities Press, 1956.
3. Rockwell, A. F. The evaluation of six social learning need constructs. Unpublished doctoral dissertation, Ohio State Univer., 1950.
4. Rotter, J. B. *Social learning and clinical psychology.* New York: Prentice-Hall, 1954.
5. Rotter, J. B. The role of the psychological situation in determining the direction of human behavior. *Nebraska Symposium on Motivation.* Lincoln: Univer. of Nebraska Press, 1955. Pp. 245-269.

6. Sears, R. R., Maccoby, Eleanor E., & Levin, H. *Patterns of child rearing*. Evanston, Ill.: Row, Peterson, 1957.

7. Sears, R. R., Whiting, J. W. M., Nowlis, V., & Sears, Pauline S. Some child-rearing antecedents of aggression and dependency in young children. *Genet. Psychol. Monogr.*, 1953, 47, 135-236.

DISCUSSION[1]

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Interest in parent-child research is not new. What is new is the attempt to conceptualize systematically avenues of parental influence on child behavior in terms of antecedent, consequent, and intervening variables, instrumental and goal behaviors, and the like. This emphasis reflects the influence of learning theory in contemporary psychology.

The papers in this symposium illustrate this trend admirably. Moreover, they move a step ahead of those learning theory paradigms which seek to analyze relationships in terms of few and relatively simple variables. The papers also illustrate three rather different approaches, showing how much room there is for varying points of view and methodologies in parent-child research.

Crandall and Sigel each select one reasonably specific aspect for comprehensive study. Each explores the dimensions of his area in a number of respects. Tyler makes a more global approach—he studies systems of parent and child motivations, looking for more numerous effects. All three illustrate how difficult it is to conduct research in this field according to a simple S-R model. Even when the *S* is conceived as varying through a specified range, this difficulty persists for at least two reasons. First, we face an open system, possessing cybernetic features, in which the effects of the stimulus situation on the response system serve to modify or "correct" the stimulus in its continuing relationship. Second, the multiplicity and complexity of important stimuli defy the experimentalist's rigorous tradition. Differences in other related but uncontrolled factors may very well give rise to the

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many contradictions which invariably occur in apparently similarly conceived studies.

Crandall has done a real service in conceptualizing three features of need achievement, which he has designated as *attention value, achievement standards,* and *achievement expectancy,* and in general tightening up the conceptualization of an important issue—that of achievement need. This need, he states, does not have a unitary quality or a monolithic character. He notes that need achievement varies by area of performance and proposes to study need achievements across several areas. Presumably, he views the concept as a loose federation of only moderately correlated aspects. Furthermore, he wants to investigate the development of these varying achievement needs which he assumes are established rather early and organize themselves developmentally over time. As he studies the expression of achievement needs in children of varying ages, he may find that these needs vary systematically with developmental stages. For example, achievement needs in the young child may relate more to motor exploration of the environment; achievement needs for a child of seven or eight may relate more to social techniques in interpersonal relations; and achievement needs of the adolescent may have a good deal more to do with heterosexual social relations.

We may question Crandall's assumption that the goal of achievement behavior is an attitude of approval or the avoidance of disapproval unless, as I think, he includes the concept of *self*-approval. Somehow we must allow for those people who need to perform excellently in areas where few if any except themselves view the results. Here, we fall back on an old, useful concept—that of the *functional autonomy of motives.* For some individuals some kinds of achievement become good in and of themselves, requiring little, if any social approval.

Sigel, investigating influence techniques, raises the question whether interviews are better than observations. It is hoped that he and his associates will publish extensively their observations on this important issue.

To enhance the value of his interview, Sigel has done several things: (a) He requires parents to relate specifics, thus breaking up general impressions into their details and providing for some self-correction; (b) he focuses on the interaction at the behavioral level, paying little attention to feelings and attitudes of the child, thus reducing the threatening quality of the interview; and (c) he probes for descriptive details of the situation, thus enhancing recall of the experience. Sigel's emphasis is on the manifest content of the parents' interactions with the child and consequently may strike some as less psychologically meaningful than material which, like Tyler's, gets at motivations.

However, Smith (5) has recently shown that, when data furnished by observations of mother-child interactions are used as criteria, interviews give information quite generally congruent with those observations. At points, however, she notes that the interview may be rather misleading and

also observes that defensive parents are able to "cover up" more adequately in interviews than in their behavior.

Tyler's work, being more comprehensive in its objectives, is therefore subject to criticism at more points. When concerned with the interactions of two psychological systems, both of these systems being constructs inaccessible to direct observation and hence largely inferential, one must be very tentative in his conclusions, and Tyler is appropriately modest. Even when he uses environmental analysis to aid his analysis of observed behaviors, he finds he must make many assumptions and interpretations in order to derive constructs which can "explain" other inferences. The matter of inferring motivations of both parents and children in interactive situations is therefore very difficult. Tyler's results will be the test of his theoretical formulation. We look forward with great interest to their extensive publication.

We are indebted to Tyler for two very significant methodological contributions. He has stressed the importance of keeping parent and child data uncontaminated by each other, and he has achieved this quite successfully in his own data. This separation controls a too often neglected source of error in many studies. Furthermore, in developing his interview technique, he has created scoring-by-example manuals, both for the fathers' and mothers' interviews and for the child's behavior. By this technique he has increased the objectivity of evaluation by raters and maximized consistent reporting of results. This is especially significant because of the inferential character of his data.

However, it seems to me that the logic of his scales presents several major difficulties. One problem is that a strong need in area A can only be indicated by an answer *inappropriate* to a question theoretically probing a different area, such as B or C, or X. Tyler provides an illustration: "The child being observed has a box of stick men; another child reaches across the table and takes some which he starts to line up in a row; if the child under observation then begins to help her instead of grabbing for his 'property' he is given a high level affection need-value rating. In other words, the child who grabs the stick men has structured the situation for dominance; the fact that the observed child responds in a friendly way is under the circumstances considered to indicate high love and affection need-value." Actually, such behavior could be interpreted as manifesting flexibility, adaptiveness, and social orientation rather than high love and affection need-value. In this child we may be dealing with a very practical politician!

Moreover, these scales are clearly not monotonic. They represent classes of observations rather than continua on which an appropriately conceptualized variable can be ordered in linear fashion. Tyler may run into some problems in statistical treatment if he has not already done so.

Furthermore, I would anticipate some additional theoretical problems when Tyler tries to deal with the "phenomenal" field of the subject, as he must if he is going to be true to his task of dealing simultaneously with

two motivational systems, that of the parent and of the child. Whether motivation can be handled independently of the person's "private world" has not yet been settled.

In concluding, I would like to point to several problems which continue to face all research workers in parent-child relations. First, there must be a clarification of how one may deal conceptually and methodologically with an open system which produces output and accepts input. Whenever a continuing or repetitive stimulus situation becomes conditional upon responses given to it (or upon expected responses), we must provide in our design for this changing situation.

To study the relationship of antecedent parental factors, we have invariably selected groups of children differing in terms of outcome variables. Too often such *ex post facto* designs rest upon selective recall by parents of relevant information. It should be possible to select groups exhibiting different family practices, atmospheres, or child handling techniques (antecedent factors) and then study the performance of children found in such groups. Thus we may get rid of some of the dangers of the *ex post facto* design.

While reorganizing designs, perhaps we ought also to consider parent behavior as a consequent, or dependent, rather than as the antecedent variable! In a longitudinal study, Baldwin (1) has shown that the psychological climate a child experiences changes systematically with development; for example, the 9- or 10-year-old gets much less nurturing and approval than the preschool child. Parental attitudes change as the life tasks of the parent change.

The longitudinal method permits a control of *ex post facto* dangers by permitting some reorganization of antecedent and consequent variables in the analysis of data, provided we have been prescient (or lucky!) enough to have collected the necessary observations. The trouble is that at the conclusion of such a study we are often more knowledgeable concerning appropriate questions to be raised than at the start! However, care to get fairly full descriptive accounts pays off. Even though styles of conceptualization change, objective description continues to be useful. Despite selectivity, good case workers manage to contribute a surprising amount of descriptive material which later workers can handle from points of view not anticipated by the case worker. In an analysis of social case records, Merrill Roff (4) is finding that the presence of or absence of certain classes of comments has high predictive value for selected behavioral outcomes. This is true even though the particular classes of comments were not systematically elicited from the case worker.

In the second place, in both theory and design we must allow for continuing change in concepts, in the referents of these concepts, and in the significance we attach to them. For example, to some it appears that adjustment is appropriately conceived as a continuing *process*—not a *state* or condition achieved or a *quality* of the person. Consequently, we must look

for *change,* for somehow states or qualities imply permanence. The concept created by our terms may delimit later percepts and concepts, and some of the stability we find in our personality designations of children may be due in part to this conservative effect of a concept on the later perceptions of the observer.

In the third place, virtually all studies have neglected a most important dimension, that of parental expectations and goals *qua parents*—ideals, expectations, and levels of aspiration for children. While these aspects of parental behavior may be more significant in some subcultures or classes of our society than in others, they are not to be neglected. Many personality theories assume that behavior is organized around and perhaps governed by integrating factors, such as "values." Possibly parental behavior is, likewise, organized around certain values or principles. The study of this variable—the parent's hopes for his child, his image of the adult the child might become—may be more fruitful than studying effects on the child of variations in modes of discipline, or authoritarian-democratic dimensions, or inferred social needs, and the like.

In the fourth place, there is the question of how many observation periods may be necessary to reveal behavior trends. Most reliability estimates are obtained by interrater agreement concerning the classification of the behavior noted or by split-half or rational-equivalence methods applied to the items of a questionnaire. The older time sampling studies of behavior amply demonstrate that a large number of behavior samples may be required to get stability in proportions of behaviors "characteristic" of different rubrics. The Smith study already referred to found that proportions of observed behaviors shifted very much across three consecutive 15-minute observations of mother-child interactions. Apparently, adult (and child) behavior can be highly variable, and to locate "style" or "mode" requires many samples of that behavior. Some use of sequential analysis technique is called for.

Finally, it must be recognized that we are dealing with an area in which crucial experiments are not likely to be possible. Hence, we look for "experiments of nature." When we adopt this method, we must look for statistical designs to enforce the controls which we would normally place there experimentally. Such controls require that we greatly improve the precision of our measuring devices. Moreover, we must adopt multiple-variable designs. Because we are coming to see parent-child relations as a very complex area in which many variables must be taken into account, we ought to measure and to include in our analysis as many variables as possible. We now have the machine techniques for analyzing a great many variables. But this brings us up against the very practical question: "Just how much data can we conceivably collect from even highly cooperative subjects?" We may ask too much of them and lose all our excellent rapport!

With all credit to the wise and skillful work reported here today, we observe that some very important methodological issues remain untouched.

How do we deal with a systems concept, in which stimulus and response situations recur sequentially (and also simultaneously!) over time, both systems being modified by their interrelationship? How do we allow for change in concepts and theory, so that concepts and constructs do not themselves limit later percepts? How do we adapt the prediction model to a situation in which so few of the relevant variables are fully understood, let alone measured? How can we extract from human beings, subject to error and fatigue, the necessary data to permit study of even a portion of relevant variables?

References

1. Baldwin, A. L. Differences in parent behavior toward three- and nine-year-old children. *J. Pers.*, 1946, 15, 143-165.
2. Barker, R. G., & Wright, H. F. *Midwest and its children.* Evanston, Ill.: Row, Peterson, 1954.
3. Moustakas, C., Sigel, I., & Schalock, H. An objective method for the measurement and analysis of child-adult interaction. *Child Develpm.*, 1956, 27, 109-134.
4. Roff, M. Preservice personality problems and subsequent adjustments to military service. School of Aviation Medicine, USAF, Reports No. 57-136, Nov., 1957, and No. 58-151, Feb., 1959.
5. Smith, Henrietta. A comparison of interview and observation measures of mother behavior. *J. abnorm. soc. Psychol.*, 1958, 57, 278-282.

DISCUSSION[1]

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The transgressions of the symposium discussant are infinite in number and variety. He pontificates, ingratiates, cavils, and castigates—often all at the same time; he utters platitudes with incredible ease; he finds fault with others, not for what they are doing, but for what they are not doing; and what they are not doing is what he would do if he were involved in research; but, of course, he is too busy discussing the research of others. In my remarks this afternoon, I shall furnish—often unintentionally—examples of these and other properties of the role behavior of discussants.

We have had an opportunity to examine a sample of what we may well assume is the best ongoing research concerning parent and child. How can we now assess the strengths and weaknesses of the studies described? Some two years ago, at a conference in this city, I endeavored to delineate some of the theoretical and methodological shortcomings of research that might explain our failure to find consistent and appreciable relations between early training and personality development (4). I suggested five such deficiencies: (a) a naive and outmoded belief in determinism; (b) inadequate specification, definition, and measurement of antecedent and consequent variables; (c) a neglect of intervening variables; (d) a neglect of factors which limit the responses of the individual; (e) the confining influence of dogma.

I shall forego any discussion of the views of determinism implied in the reports of these investigators; it would take us too far afield into the philosophy of science. The remaining four items, however, may serve as a point of departure for some evaluative comments.

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First, with regard to antecedent and consequent variables, the care with which they have been specified and defined in all three studies is noteworthy. But, on the matter of choice of variables to be studied, there is a marked difference among the investigations. The Merrill-Palmer study concerns itself exclusively with overt behavioral interaction—action and reaction—stimulus and response. Sigel is well aware of the existence of a controversy over covert vs. overt variables: Is it what the parent does *or* what he feels *or* what he is that makes the difference? Sigel quite properly suggests that the issue can be resolved by speaking of covert *and* overt behavior just as the heredity-environment controversy has been resolved by substituting *and* for *or*. But the recognition of the "and" relationship makes it all the more essential to study them together, not in isolation. If the marriage cannot be managed operationally, at least, it should be recognized conceptually. As a matter of fact, Sigel, despite his protestations of behavioristic purity, does, by inference, study some variables at the covert level. When he invokes the concept of power, he seems to me to admit into his research domain such correlates as parental affect, conation, and cognition. Witness his references to parental willingness, wishes, feelings, conflict, and rationale for behavior. It is difficult to see how coding of influences techniques could be accomplished without reference to such covert characteristics. An accepting parent, an ambitious parent, and a rejecting parent might be equally power-assertive in behavioral terms; the impact of that assertiveness on the behavior of the child should surely vary. I say this despite the fact that Sigel has presumably found significant results within his mechanistic framework.

In contrast, the other investigations frequently concern themselves with overt behaviors only to infer covert variables: Tyler, to describe motivational structure of his subjects; Crandall, to discover something of both the cognitive and conative properties of his parent and child subjects. Crandall's recognition of the fact that people *know* and *think* as well as *strive* and *feel* is worthy of particular commendation.

Now, on the matter of intervening variables: To discover a relationship between antecedent and consequent variables is to explain little or nothing. It only leads to a search for those variables or processes that mediate that relationship—or to a theory, if you please. The impressive data that Sigel has collected surely predispose us to look for a theory of action that will "specify what kind of behavior can be expected . . . under some specific circumstances" (5, p. 477). Crandall's investigation holds considerable promise of eliciting those conditions which lead to the modification of the potentialities within the child for future behavior of a particular sort, namely, achievement, thus furnishing clues for a theory of change or learning.

To digress a bit, I am somewhat troubled by the Crandall conceptualization. As he admits, his achievement behavior—with its reinforcement the approval or disapproval of self or others—is of a rather mundane variety.

Thus, he may not succeed in casting much light on the individual who strives and persists in the face of almost universal disapproval—sometimes including that of self—as we see in the evil genius, the madness of self-destructiveness, the driven, almost desperate quality of some exceptional behavior. His model is more of a Longfellow than a Baudelaire, more of a valedictorian than a Zen-Buddhist. He recognizes the variable of hope of success; he overlooks the variable of fear of failure that underlies much achievement behavior (1, 2), especially in a society that values success and conformity so highly. Moreover, I miss in Crandall's formulation the distinction between choice of goal and choice of means to that goal. Wright's study (6) of some years ago suggests that children simultaneously maximize the possibility of accomplishment by choosing the more inaccessible or difficult goal and the possibility of success by choosing the easier means to that goal.

About Tyler's study, I feel less certain, probably because I have such a slight acquaintance with Rotter's social learning theory. But I would judge that his results are in the form of specifications of degrees of resemblance between parent and child in motivational structure. Like correlation coefficients between parent and child in height or in intelligence, such knowledge would be interesting but would seem to leave us still far short of understanding the origins and development of that resemblance.

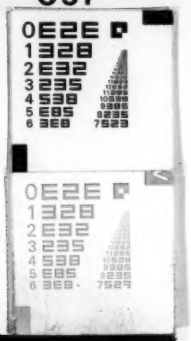
Now we may ask: To what extent do these investigations take into account factors which limit the responses of the individual? I am sure that, had time permitted, all the participants would have had something to say about such individual factors as sex, age, and social status. Surely, they made abundantly clear that they were fully aware of the shaping of behavior by situational factors. Particularly in the Tyler study do we find what is certainly a significant contribution to both conceptualization and methodology in this respect.

On the question of the confining influence of dogma: "It is not that we need less theory; in fact, we need more and better theory. But theory, with its concepts, its postulates and theorems, needs to be the servant, not the master, of the research worker. We need more theoretically-oriented research workers; we need fewer theoretically-committed ones" (4, p. 45). Perhaps Darwin put it best: "All observation must be for or against some view if it is to be of any service." What of the research reported here? I would judge that the most theoretically-committed is the Southern Illinois project; whether this allegiance will prove to facilitate or limit the value of the findings remains to be seen. The Merrill-Palmer project, at the other extreme, is almost Skinnerian in its atheoretical approach. It is a descriptive study. In view of our lack of knowledge of parent-child interaction, there need be no apology for that. Quite the contrary. The dirty work of collecting such data has too long been delayed. But the Fels Research Institute project represents, for me, at least, the happiest marriage of empiricism and theory or of "fact and fancy," to borrow MacKinnon's phrase (3). Its

theoretical orientation is pluralistic, although, as we have already suggested, it might benefit from a somewhat more analytic examination of the dynamics of achievement behavior.

If, at this point, I have shed little light on the significance of these reports of parent-child research, I hope I have sufficiently demonstrated the role of discussant. The researchers can now go back to work; this discussant can retire until the next symposium.

References

1. Douvan, Elizabeth, & Adelson, J. The psychodynamics of social mobility in adolescent boys. *J. abnorm. soc. Psychol.*, 1958, 56, 31-44.
2. McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. *The achievement motive.* New York: Appleton-Century-Crofts, 1953.
3. MacKinnon, D. W. Fact and fancy in personality research. *Amer. Psychologist,* 1953, 8, 138-146.
4. Martin, W. E. Effects of early training on personality. *Marriage Fam. Living,* 1957, 19, 39-45.
5. Sears, R. R. A theoretical framework for personality and social behavior. *Amer. Psychologist,* 1951, 6, 467-483.
6. Wright, H. F. The influence of barriers upon the strength of motivation. *Contr. psychol. Theor.*, 1937, 1, No. 3.

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